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Understanding Public Attitudes towards Transit at Statewide and Local Geographies

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Understanding Public Attitudes Towards Transit at Statewide and Local Geographies

by

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Report

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Abstract

Understanding Public Attitudes Towards Transit at Statewide and Local Geographies

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This report examines public sentiment towards transit at statewide and local geographies using results from the 2014 Texas Transportation Poll. The 2014 Texas Transportation Poll, conducted by researchers at the Texas A&M Transportation Institute, asked the following open-ended question of Texans: "what is the most significant transportation issue affecting you personally in your region?" The question elicited over 3,000 independent responses, over 10 percent of which made reference to public transportation. Many of these comments about public transportation were from respondents in the Austin region, and expressed support for additional or improved public transit services. Paradoxically, in the fall of 2014, residents of Austin voted down a bond proposal that would have created an urban rail line and funded road improvements.

This study explores the use of qualitative analysis to extract meaningful insights from public comments, using the comments received from the Texas Transportation Poll to explain the discrepancy between opinions expressed in the poll and voting behavior

during the Austin urban rail proposal and to assess the usefulness and limitations of qualitative analysis on open-ended opinion data. Findings from this analysis reveal opportunities for improving public support of public transit initiatives by understanding and incorporating public sentiment at the state and local level and contribute to a new way for transportation agencies to interact with and understand the travel needs of their constituents in the 21st century.

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Chapter 1: Introduction

BACKGROUND

The 2014 Texas Transportation Poll asked the following open-ended question of Texans: "what is the most significant transportation issue affecting you personally in your region?" The question elicited over 3,000 independent responses. Over 10 percent of these made reference to public transportation (Ettelman, Trendler, Griffin, & Geiselbrecht, 2015; Simek & Geiselbrecht, 2014). Many of these comments about public transportation were from respondents in the Austin region, and expressed support for additional or improved public transit services. Paradoxically, in the fall of 2014, residents of Austin voted down a bond proposal that would have created an urban rail line and funded road improvements (Henry, 2014). What can explain this paradox?

A thorough understanding of public opinion can help to ensure public acceptance and understanding of transportation initiatives such as the proposed urban rail bond. Incorporating public comments in transportation planning and when making major transportation funding decisions is not only considered best practice, it is mandatory for metropolitan planning organizations (MPOs) and many public agencies. This is carried out primarily through public meetings and hearings, public opinion polling, and other forms of public engagement. However, these methods do not always succeed in engaging the wider public. Agencies therefore face an increasing challenge to respond to and incorporate public opinion into their plans in a way that is cost-effective and engenders the greatest public support.

Analysis of qualitative data is one way in which agencies can improve their understanding of public opinion. The availability of open-ended public opinion data is growing exponentially as the Internet, mobile phones, and other means of communication are increasingly adopted, providing a vast database of freely expressed public opinion. As

of 2014, 87 percent of American adults were online, up from just 14 percent in 1995 (Pew Research Center, n.d.). Of these, 74 percent of all internet users use social networking sites such as Twitter, and 34 percent had used social media for civic engagement (Duggan, Ellison, Lampe, Lenhart, & Madden, 2015). Although most social media tools and platforms are free to use, they require staff time and resources to monitor and maintain (Bregman, 2012). In many cases, transit agencies dedicate at least 40 hours, and in some cases up to 80 hours of staff time to social media each month (Bregman, 2012; Newcombe, 2015). Better handling and response to this emerging volume of public opinion data is a challenge facing many public agencies, including public transit agencies (Watkins, Xu, Bregman, & Coffel, 2015).

This study will explore the use of qualitative analysis for extracting meaningful insights from public comments, using the comments received from the Texas Transportation Poll as a proof of concept. Using results from the Texas Transportation Poll and the Austin urban rail proposal as an example, this study hopes to explain the discrepancy between opinions expressed in the poll and voting behavior during the Austin urban rail proposal and to assess the usefulness and limitations of qualitative analysis on open-ended opinion data. Results from this study contribute to a new way for transportation agencies to interact with and understand the travel needs of their constituents in the 21st century.

RESEARCH QUESTIONS

The primary research question addressed in this study is: How can planners and policy makers better leverage information on public opinion and sentiment to improve transportation planning, policy decisions, and investments? Therefore, the aim of this study is two-fold: to explain the paradox between support for public transportation and

the results of the urban rail vote, and to explore the use of qualitative methodologies which could help agencies better understand and respond to public opinions.

In order to answer this research question, several working questions guide the study. First, what does public opinion polling tell us about the major issues and preferences of Texas travelers? More specifically, what do comments received through the Texas Transportation Poll regarding access to public transportation tell us about public transit needs in Texas? Finally, what is the observed public attitude towards transit at both statewide and local (Austin region) geographies? Taking the geographic context of comments into consideration, this report explores whether positive or negative public sentiments towards public transportation in the Austin area align geographically with previously observed support for urban rail.

METHODOLOGY

A mixed-methods approach is used to provide answers and insights to the research questions, including: exploratory data analysis (data mining) in the spirit of grounded theory research, qualitative and quantitative analysis of public opinion poll data, sentiment analysis, and geographic analysis. After analyzing data through these methodologies to answer the research and working questions, this report discusses the implications of these findings for future public transportation proposals in Texas.

REPORT STRUCTURE

This report begins with a review of existing literature on the use of qualitative methods in transportation planning and policy, grounded theory, and sentiment analysis. Next, the methodology used to conduct the analysis for this report is explained in detail, including a description of the application of grounded theory to open-ended survey questions, the use of computer assisted qualitative analysis software, the application of

sentiment analysis, and methods used for geographic analysis. Following the literature review and methodology, analysis of the perception of Texans towards public transportation begins first at the statewide level, then narrows to the Austin region. Finally, this report concludes with a discussion of results and implications of this analysis, limitations of this study, and avenues for future research.

Chapter 2: Literature Review

PUBLIC ENGAGEMENT PRACTICES IN TRANSPORTATION PLANNING

Public engagement is a critical component of any planning practice, and in transportation planning in particular. Public engagement in planning has been a cornerstone of good planning practice for at least the last 25 years. The character of participation and its status in planning and policy making was insightfully outlined in Shelly Arnstein's ladder of public participation in 1969, which depicted levels of citizen involvement as a ladder, with top down manipulation at the bottom and citizen control of the public agenda at the top (Arnstein, 1969). Public involvement in transportation is now not only considered best practice, it is enshrined in law under 23 CFR 450.210, which requires early and continuing public involvement in federal transportation planning (U.S. Department of Transportation Federal Highway Administration, n.d.). In addition, several pieces of authorizing legislation for the federal aid highway program, which includes funding for transit projects, include public involvement as a key component of transportation planning. Most recently, Moving Ahead for Progress in the 21st Century Act (MAP-21) which was signed into law in 2012.

In addition to satisfying federal regulations, public involvement provides many benefits in a transportation planning process - participation can improve public acceptance of a plan or project and support the deliberative democratic process (Brabham, 2009). Other benefits include the contribution of non-expert knowledge (Brabham, 2009). Transportation planners should therefore strive to engage with the public in the most meaningful way possible, so as to climb to the highest rung of the ladder of public participation and best leverage both local and expert knowledge.

PUBLIC OPINION POLLING IN TRANSPORTATION PLANNING

Meaningful public engagement in a transportation project requires a full and complete understanding of the opinions held by the people who will be affected by that project. Before a public will lend its support to a transportation improvement project, they will want to first be assured that:

- The project is needed.
- It represents the best available option.
- The responsible agency is spending money wisely and effectively.

The most direct way to know where any public stands on a project is simply to ask. Public opinion polls, borrowed from the field of market research, are the most common way of deducing what the public thinks about a particular transportation plan or issue (U.S. Department of Transportation Federal Highway Administration, 2002). Opinion research techniques are designed to represent the opinions of an entire population by measuring the opinion of a specific sample. Transportation agencies have widely adopted opinion research as a technique to help understand the opinions of public (U.S. Department of Transportation Federal Highway Administration, 2002). Public opinion research can be used to assess statewide needs and perceptions, test outreach materials, or understand the decision-making process of a specific subset of the population (Bernasconi, Zhong, Hanifin, Slowik, & Owens, 2015; Watkins et al., 2015).

Public opinion polls assess widespread public opinion by administering a survey instrument to a sample group via a written questionnaire or interviews in-person, online, or over the phone (U.S. Department of Transportation Federal Highway Administration, 2002). They can be formal or informal. Formal scientific surveys, where the sample is statistically representative of a larger group, can provide broadly applicable results. For example, statistically valid samples can be chosen to include people within a specific

geographic area, income group, or other category. Informal surveys can also be used to provide interesting insights and opinions or a broader range of opinions, though they cannot be said to be statistically representative of an entire population.

Public opinion polls are administered for a variety of reasons. Transportation agencies can use the results from opinion polls to gauge the acceptability of a project or plan to the general public, or test their perception of public opinion (U.S. Department of Transportation Federal Highway Administration, 2002). Opinion polls can be administered at any point during a transportation project or planning process – before, during, and after – to illicit public opinion. When done successively over time, polls can help track shifting public sentiment and help agencies understand the public's awareness of and support for a project (U.S. Department of Transportation Federal Highway Administration, 2002).

There are many examples of the influence of opinion research as a public engagement technique in transportation planning. For example, transit agencies are increasingly being encouraged to gain a better understanding of public opinion in order to improve public transportation services. A recent study by the Mineta Institute utilized a series of public opinion polls of likely voters coupled with an educational campaign to assess public sentiment toward transit in Southeast Michigan (Bernasconi et al., 2015). Results from the study provided insight on how public opinion related to respondents' socio-demographic, political, and geographic characteristics. This information was then used to craft specific policy recommendations for future transit initiatives in the region, which included public education regarding transit and transit funding, better public accountability, and greater agency transparency. Eventually these results will help transit agencies in Southeast Michigan to promote higher public support for transit initiatives and spending in the region. Similarly, research on public perception and attitudes is

critical in Texas, and the Austin region in particular, where securing public support for transit investments has faltered in recent years (Batheja, 2014; Simek & Geiselbrecht, 2014).

HOW QUALITATIVE METHODS CAN INFORM TRANSPORTATION PLANNING AND POLICY

Public opinion polls are often based primarily on quantitative questions for ease of analysis. Indeed, transportation planning has 20th century roots in quantitative methods. However, planners are increasingly using qualitative methods to incorporate personal narratives into the process. Richard Willson contends that placing language and discourse at the core of transportation planning forms a basis for "communicative rationality" that has become a dominant method for combining sound transportation planning methods and public policy (Willson, 2001). Narrative and storytelling are valuable means of understanding the public, but the traditional planning process has constrained this information to pre-conceived public engagement processes included as portions of planning processes. This can lead to the omission of key issues, such as social exclusion and justice, in both the transportation planning process and resulting plans (G. Griffin, 2014; McCray & Brais, 2007). McCray and Brais suggested incorporating questionnaires and other methods of eliciting qualitative feedback in order to address this gap in the data (G. Griffin, 2014; McCray & Brais, 2007).

However, collecting, managing, and analyzing qualitative data presents another set of challenges. Once comments have been collected, planners and researchers are faced with a challenge of what to do with them. Moreover, despite the emphasis on public involvement in transportation planning, citizens can become disenfranchised if they feel their voice isn't being heard or incorporated into decision-making. They may be less

inclined to participate if they feel their specific comments are not being adequately addressed.

A growing body of research explores the importance of geographic specificity in the design of public involvement for transportation planning. Many public comments are tied to a specific geographic point on a map. However, geographic specificity must be explicitly asked for in a questionnaire in order to garner useful results (G. Griffin, 2014). For example, in the responses to a public involvement questionnaire for a rural county's transportation plan, researchers found that while responses were useful for identifying transportation issues, they did little to tell planners exactly where problems were located (G. Griffin, 2014).

A similar approach is to glean insight from existing geographic data. Griffin suggests that researchers should continue to experiment with volunteered geographic information, such as Strava and other user-provided sources (such as the comments received in the Texas Transportation Poll), to continue engaging with the public in a meaningful way (G. Griffin, 2014). For example, Strava is a smartphone-based fitness app used by runners and cyclists to track distance and speed; by tracking their routes and distances travelled, users end up volunteering a stream of geographically specific data on their travel behavior and preferences. Recently, data collected from Strava was used to assess where cycling for health occurs in Austin, Texas, providing an example of the potential to study transportation and the built environment through user-provided data (G. P. Griffin & Jiao, 2015). Aggregating the data or comments received through volunteered geographic information or open-ended questions can be used to leverage the collective wisdom of the public, which may eclipse the knowledge of any one single individual, to generate new ideas and new solutions to transportation issues. As Brabham explains: "planning decisions are not about the will of the simple majority. They are about the

ways in which communities provide qualitative commentary on how they want to see their future built environment" (Brabham, 2009).

REDUCING BIAS OF CONTENT ANALYSIS USING GROUNDED THEORY

Silverman contends that qualitative methods add to the research capacity of planning scholars and professional scholars, and can be particularly beneficial when the perceptions of stakeholders are multifaceted or nuanced (Silverman, 2015). There are generally two main approaches to classifying qualitative information—using categories or themes previously created by the researchers or others to begin grouping information, or using the language of the subjects to form the basis of categorization. The latter approach is termed *grounded theory*, where researchers use the subjects' language to dominate the categorization and reduce bias from researchers' perspectives (Yu, Jannasch-Pennell, & Digangi, 2011).

Central to qualitative data analysis is coding. It involves sorting data into categories for further analysis. There are two primary types of coding data: open coding and focused coding (Silverman, 2015). Open coding involves reading through data line-by-line and assigning codes to discrete excerpts in the data (Silverman, 2015). Focused coding then takes the results from open coding and begins to synthesize data into overarching categories (Silverman, 2015). Once data is coded, researchers sort it and develop filing systems (Silverman, 2015). In the past this process involved placing hard copies of data into physical files and folders. Recent research in linguistics and database management has overlapped to form qualitative data analysis software that combines the power of computer algorithms with the common sense power of personal narrative. Sorting and organization of coded data is therefore now possible using specialized software for qualitative analysis such as NVivo or Atlas.ti (Silverman, 2015).

MINING PUBLIC SENTIMENT USING ONLINE SOFTWARE

NVivo is a platform that enables easy storage, searching, and organization of a variety of qualitative data. Qualitative data can be collected from various sources including news articles, user comments, surveys, or social media, among others. Using NVivo, researchers can conduct both open and focused coding of data, and later use the software to sort and file the coded data. Gaber and Gaber (Gaber & Gaber, 2007) explain that this software improves the process of analyzing written language in three ways:

- Quick summarization of public comments according to coded attributes.
- Searching text for topical relationships.
- Organizing topics of discussion based on respondent attributes, such as demographics.

Planning researchers are increasingly adopting this specialized software to enhance qualitative analysis, including in the field of transportation planning. Researchers recently used NVivo in the national evaluation of the Seattle/Lake Washington Corridor (LWC) Urban Partnership Agreement (UPA) under the United States Department of Transportation UPA program (Schroeder et al., 2014). The UPA project focused on reducing congestion in the corridor. Researchers used NVivo to conduct descriptive coding analysis of media and interviews in preparation of the report. News media coverage of the project were coded for common themes using NVivo, through which researchers determined the positive or negative content of articles regarding the project. NVivo was also used to organize the data received from interviews. The results of interviews, workshops, and focus groups local stakeholders, and surveys of different user groups were stored, organized, and analyzed using NVivo.

These modern qualitative analysis platforms allow development of databases that can be further mined for linguistic characteristics, such as relative positive or negative

sentiment regarding certain issues. The process of analyzing language for positive or negative characteristics is known as sentiment analysis. For example, a recent sentiment analysis regarding transportation in Austin found social media discussions concerning drunk driving to be associated negatively, while a new carsharing service was seen as the most positive topic (Evans-Cowley & Griffin, 2012). A more recent study underscored the value of sentiment analysis in transportation by evaluating discourse on Twitter about transportation agencies, recommending agencies engage with the public through new media to have a positive influence on agency communication with the public (Schweitzer, 2014). Sentiment analysis has also recently been conducted on Twitter feedback as a tool for public transit companies to measure rider satisfaction and create agency performance metrics (Collins, Hasan, & Ukkusuri, 2013). The sentiment software used in this study (Linguistic Inquiry and Word Count) has been validated in terms of estimating emotional expression found in text from a range of subjects (Kahn, Tobin, Massey, & Anderson, 2007). Methods from the previous studies serve to guide this study.

Chapter 3: Methodology

OVERVIEW

This report analyzes both statewide and local sentiment toward public transportation using data from the 2014 Texas A&M Transportation Institute's Texas Transportation Poll. Comments from the Texas Transportation Poll are first evaluated for common themes, then categorized into topical nodes, such as "public transportation," using NVivo software. Comments regarding public transportation are then grouped into sub-categories using NVivo software.

Statewide analysis begins by mapping the open-ended comments received regarding public transit during the Texas Transportation Poll by region, using NVivo qualitative analysis software and ArcGIS software. The socio-demographic characteristics of commenters present in the data is also reported. The sentiments of statewide responses are then assessed using the Linguistic Inquiry Word Count (LIWC) online tool and mapped using ArcGIS.

Digging deeper into a specific transportation initiative, this report then explores public sentiment toward public transportation in the Austin, Texas area during the recent urban rail proposal by comparing data from the Texas Transportation Poll with existing public transportation service and results from the 2014 bond election. As with the statewide analysis, open-ended comments referencing public transportation in the Texas Transportation Poll are mapped across the Austin region by zip code. The sentiments of each of the sub-categories are also assessed using the LIWC online tool and mapped at the local level. These results are then compared with existing transit service in the Austin region, allowing discussion of the similarities and/or differences that are found between public sentiment and existing service. Finally, the results from the urban rail vote are

compared with the results from the sentiment analysis, allowing a comparison of citizens' stated preference with their voting behavior.

DESCRIPTION OF DATA

The 2014 Texas Transportation Poll was conducted in the spring of 2014 by researchers in the Transportation Policy Research Center of the Texas A&M Transportation Institute (TTI) and was the first of its kind in Texas. The poll examines the travel behavior and opinions of registered voters in Texas and was supported by the Texas legislature in part to help inform transportation policy discussions. Results from the poll explain what Texans think about daily transportation choices, challenges, funding, and solutions to pressing transportation issues. Researchers plan to repeat the study again in two years in order to track changes in public opinion and travel behavior among registered voters over time.

The poll asked over 140 structured questions and just one open-ended question (the full list of questions is provided in Appendix A). Major themes examined in the study were: travel behavior, travel solutions, transportation funding, customer satisfaction with governmental agencies, and demographics. Though primarily seeking quantitative results, the poll asked one open-ended question, "what is the most significant transportation issue affecting you personally in your region?" which received over 3,000 independent responses. It is the responses to the open-ended question that will be analyzed in this report. Additional demographic data, such as participant gender, age, and location, as reported in the poll, will also be used in the analysis.

The random sample of over 5,000 respondents was drawn from a database of all registered mailing addresses in the state of Texas. Survey respondents were required to be registered voters, over 18, and able to speak Spanish or English at a level adequate to be

able to complete the survey (Simek & Geiselbrecht, 2014). Responses were weighted by region to be statistically representative of the viewpoints of Texans. The goal was to survey 375 persons per region, or 4,500 statewide, providing a regional confidence interval of 5 percent, and a 1.5 percent confidence interval statewide (Simek & Geiselbrecht, 2014). The large size of the sample allows researchers to investigate the behavior and opinions based on demographic variables such as age, sex, and income (Simek & Geiselbrecht, 2014).

The random sample survey responses were collected by phone, mail, and online. The sampling methodology involved geographically stratifying Texas into 12 survey regions, with each made up of one or more Texas Department of Transportation districts. These districts (see Figure 1) are not only familiar but also provide a logical geography upon which to draw statistical estimates of public opinion regarding transportation (Simek & Geiselbrecht, 2014).

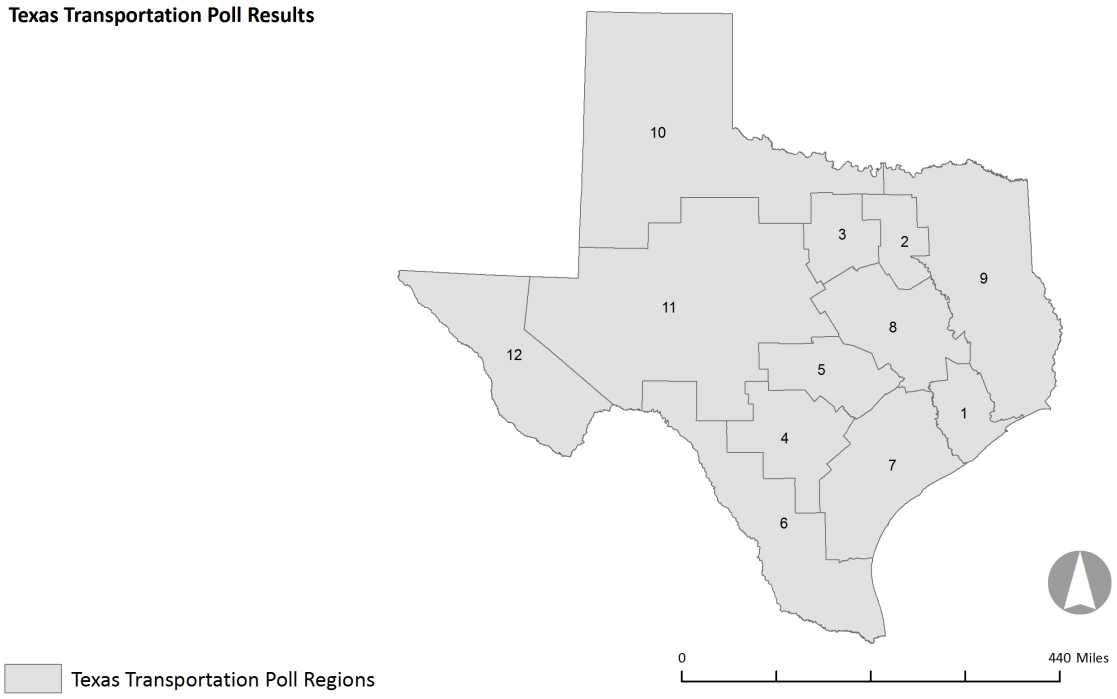


Figure 1. Location of Texas Transportation Poll regions

QUALITATIVE DATA ANALYSIS

The volume and content of the comments were analyzed with the help of NVivo, a computer assisted qualitative data analysis software which enables easy organization and categorization of qualitative data. NVivo can be used to conduct analysis on a variety of qualitative data sources, including open-ended questions, using search, query, and visualization tools within the software. For this effort, NVivo was used to conduct a frequency analysis of all comments and an in-depth analysis of the key themes found in the comments. Comments were first manually coded into categories, allowing the author to map common threads and begin to see patterns in the responses. After initial coding by researchers, the NVivo software was used to auto-code the remaining responses based on the existing coding pattern detected.

Frequency analysis

The first step in the qualitative analysis process was to review the responses to the open-ended question, "what is the most significant transportation issue affecting you personally in your region?" to find key themes. The method used for reviewing the responses is based in grounded theory. Rather than seeking answers to predetermined research questions, the data is first examined for patterns, from which further research questions and hypotheses might arise. Following this method, responses to the open-ended question were reviewed to find key themes. A word frequency query revealed basic patterns in the responses (represented as a word cloud in Figure 2). Results from the word cloud indicate that respondents were primarily concerned with auto-based transportation issues: roads, traffic, congestion, construction, and gas prices were commonly used words to describe the most significant transportation issue affecting them personally.

Figure 2. Word cloud displaying word frequency for responses to open-ended question "what is the most significant transportation issue affecting you personally in your region?"

Categorization of comments

Comments were next manually coded into categories or "nodes" by the author and another researcher at TTI using NVivo software. A random sample of 100 of the 3,000 independent responses to the open-ended question was first manually coded into categories, representing three percent of total responses. Lacking exact studies to guide this relatively new methodology, this number was based on the judgment of researchers. Later, the entire sample of 3,000 comments was coded into the same categories - after initial coding by researchers using of the first 100 responses, the NVivo software was able to auto-code the remaining responses based on the existing coding pattern detected. Initial coding of a small sample allowed researchers to map the common threads and begin to see patterns in the responses, which were later extrapolated out to all 3,000 responses. Building on the pattern that emerged from the first sample of responses and from keywords observed in the word cloud, researchers categorized the responses into the following ten topical nodes, which focus on identifying transportation issues:

- bicycle and pedestrian issues,
- congestion,
- construction,
- drivers,
- gas prices,
- road maintenance,
- planning,
- public transportation,
- safety,
- and toll roads.

The remaining 3,000 comments, after the initial 100, were then organized into these categories using text search queries in NVivo. For example, a query for the words "gas price," including synonyms, brought up 875 responses from 541 respondents, such as "*fuel prices*" and "*price of gas is too high*," which were then coded into the node for gas prices. This process was repeated for each of the ten nodes. Responses that contained multiple references, for example "*gas prices and congestion*," were coded into more than one node.

After initial coding by researchers using the text search query method, the NVivo software was able to auto-code the remaining responses based on the existing coding pattern detected. The author then conducted manual coding and/or un-coding of responses into appropriate nodes to ensure accuracy. For example, because the word toll is a synonym for price, many responses regarding toll roads were incorrectly coded into the gas price node. The author manually reviewed the nodes for inaccuracies and ran text search queries to find and remove unrelated responses in each of the ten nodes.

Accuracy testing

The next step was to conduct accuracy testing to review the internal validity of coding results and resolve conflicts as necessary. Conducting a coding comparison helps to minimize the potential for researcher bias when categorizing responses. Using the *Coding Comparison Query* function in NVivo, researchers were able to develop two separate measures of agreement. The first is called the Kappa Coefficient and the second is the comparison of the percentage agreement between the two researchers.

Agreement between researchers is based on whether researchers placed specific comments into the same category, or different categories. The Kappa coefficient is a statistical measure which takes into account the amount of agreement between

researchers that could be expected to occur through chance when categorizing responses (NVivo, 2015). A Kappa coefficient less than 0.40 indicates poor agreement between researchers, 0.40 to 0.75 indicates fair to good agreement, and over 0.75 indicates excellent agreement between researchers (NVivo, 2015). The Kappa coefficient was between 0.2829 and 0.964 for each node, with an average Kappa score of 0.6307, indicating a good level of agreement between researchers.

The percentage agreement between researchers is the specific number of units of agreement divided by the total units of data, displayed as a percentage (NVivo, 2015). Whereas the Kappa coefficient focuses on statistical probability, the percent agreement focuses on the actual occurrences where researchers coded words within the same categories. The measure of agreement between researchers averaged 93.29% while disagreement averaged 6.70%, indicating a high level of reliability between researchers. Agreement between researchers was highest for the public transportation, gas prices, and maintenance categories, indicating that researchers' decision to code responses into those categories overlapped the most. Researcher agreement was lowest for the bike and pedestrian, congestion, and planning categories.

SENTIMENT ANALYSIS

The responses within each node were aggregated by topic and analyzed using Linguistic Inquiry and Word Count (LIWC) software to determine their overall sentiment. LIWC is an empirically validated linguistic software that infers psychological and emotional reactions in written text. The LIWC analyzes text on a word-by-word basis, as opposed to analyzing entire phrases, and then calculates the percentage of words that are correlated with positive or negative emotions. For example, psycholinguistic research has correlated words such as "love," "nice," and "sweet" with positive emotions,

which are rated as positive by the LIWC tool, and correlated words such as "hurt," "ugly," and "nasty" with negative emotions, which are subsequently rated as negative by the LIWC tool (Tausczik & Pennebaker, 2010).

GEOGRAPHIC ANALYSIS

Responses to the entire Texas Transportation Poll were geocoded to the centroid of each respondent provided zip code, allowing for spatial analysis of responses. It is important to note that because each comment is displayed at the centroid of each zip code, the location on the map of each comment does not represent the actual address or location of that commenter. Figure 3, below, shows the twelve regions and geographic location of all responses to the 2014 Texas Transportation Poll.

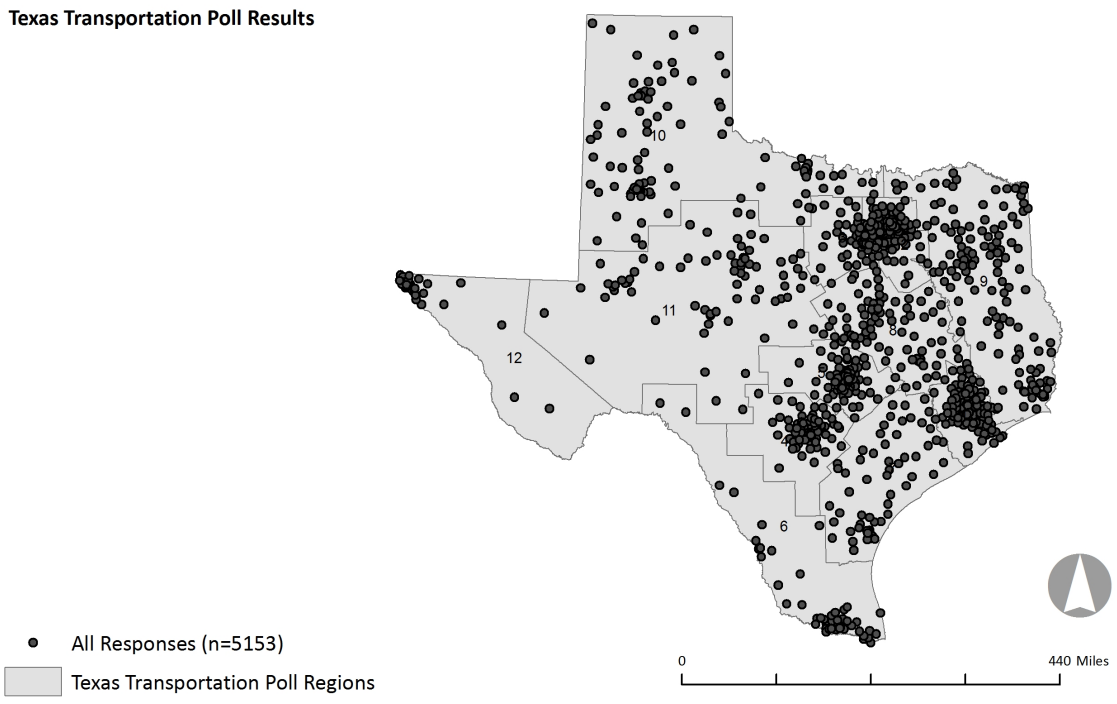


Figure 3. Geographic location of all responses to the 2014 Texas Transportation Poll.

For comparison with local transit access in Chapter 5, the U.S. Environmental Protection Agency (EPA)'s transit accessibility metric was used. The EPA's transit accessibility metric is the aggregate frequency of transit service within 0.25 miles of block group boundary per hour during the evening peak period (Ramsey, 2014). This metric is calculated for all census block groups in the U.S. with participating General Transit Feed Specification (GTFS) transit service areas, and made available to the public for download through the Smart Location Database (Ramsey, 2014). The EPA obtained GTFS data for use in their transit accessibility metric during the months of December, 2012 and January, 2013 (Ramsey, 2014).

Chapter 4: Statewide Sentiment toward Public Transportation

This chapter begins with presentation of statewide results of analysis of the Texas Transportation Poll comments, a comparison of public transportation comments with overall demographics of survey respondents, and the results of other transit-related questions in the Texas Transportation Poll. Further analysis of public transportation comments, including categories that emerged from qualitative analysis of all responses, the sub-categories that were found within the public transportation node, and the geographic location of sentiment for each category is presented. This chapter also presents the statewide sentiment analysis toward all topics and toward public transportation by region.

STATEWIDE TEXAS TRANSPORTATION POLL RESULTS

Analyzing the qualitative data received from the open-ended question, "what is the most significant transportation issue affecting you personally in your region?" in the 2014 Texas Transportation Poll provides insight into what Texans think are the most significant transportation issues affecting their respective regions. Evaluating both the volume of comments regarding each topic and the overall sentiment of those responses can reveal unique insights into what the public feels are the most pressing transportation issues.

Surprisingly, public transportation ranked as the fourth most frequently mentioned topic, garnering 369 individual references throughout all of the unique responses. The most frequently mentioned topic was traffic congestion. Gas prices and construction were also among the most frequently referenced topics. Figure 4 shows the relative frequency of the ten main topics identified.

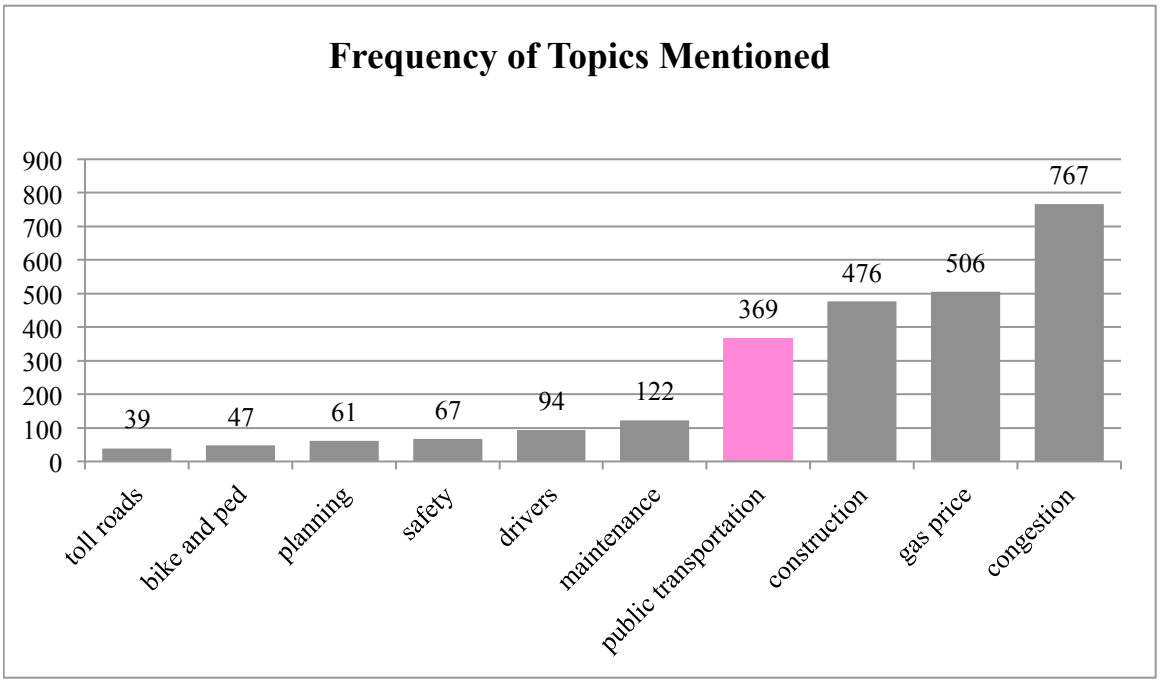


Figure 4. Frequency of topics mentioned in response to open-ended question

The following map shows the location of each response mentioning public transportation.

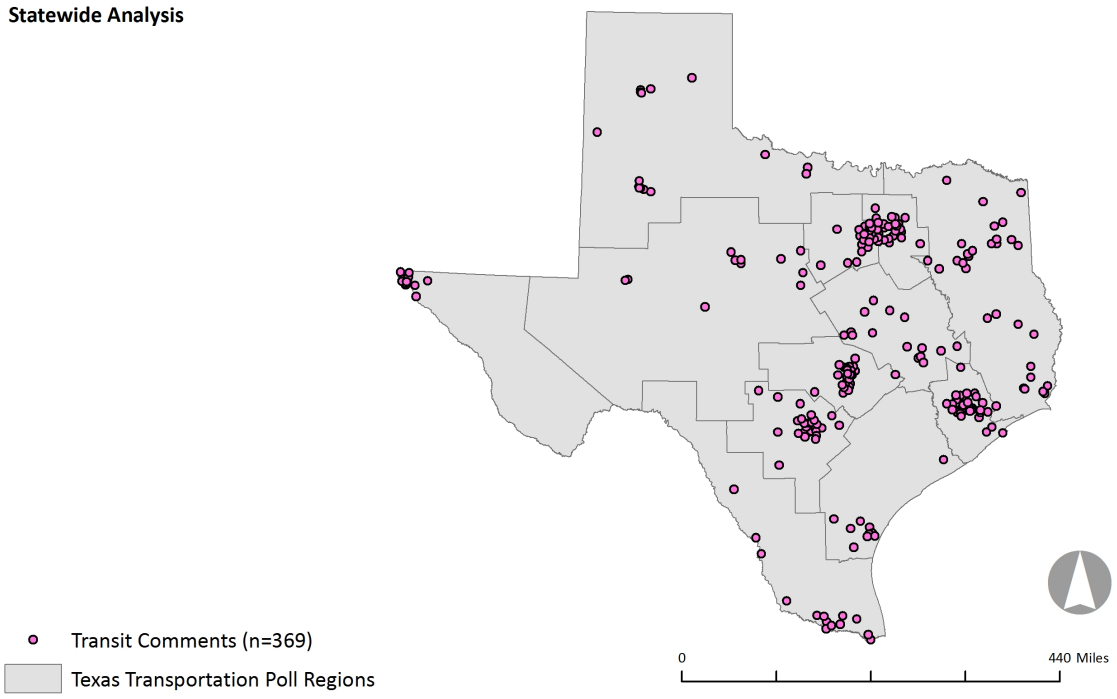


Figure 5. Geographic location of comments regarding public transportation

SOCIO-DEMOGRAPHIC ANALYSIS

The large sample drawn for the Texas Transportation Poll allows for statewide analysis based on socio-demographic characteristics of respondents. Table 1, below, compares selected socio-demographic variables of respondents statewide with those who commented regarding public transportation in the open-ended question (referred to as "sample" in the table below). Respondents who commented regarding public transportation differed from the overall population of Texans – they were more likely to be female, more likely to be black or Hispanic, and tended to be younger than the general population. Additionally, respondents concerned with public transportation had lower household incomes than the statewide population. The level of education between groups did not vary.

Table 1. Comparison of selected socio-demographic variables between public transportation commentators and all respondents statewide				
	Statewide (n=5,153)		Sample (n=369)	
	n	%	n	%
Sex				
Male	2,487	48%	153	41%
Female	2,657	52%	216	59%
Age				
18-24	503	10%	33	9%
25-34	1,022	20%	87	24%
35-44	972	19%	72	20%
45-54	992	19%	60	16%
55-64	1,065	21%	99	27%
65+	599	12%	18	5%
Race/Ethnicity				
Hispanic	1,616	31%	128	35%
White	2,987	58%	173	47%
Black or African American	369	7%	53	14%
American Indian or Alaskan Native	48	1%	5	1%
Asian	108	2%	9	2%
Other	25	0%	1	0%
Income				
Less than $25,000	978	19%	103	28%
$25,000 to $74,999	2,348	46%	172	47%
$75,000+	1,827	35%	94	25%
Education				
Less than high school	189	4%	17	5%
High school diploma/GED	835	16%	64	17%
Some college or associates/technical degree	1,939	38%	139	38%
Bachelor's degree or higher	2,190	42%	149	40%

Source: 2014 Texas Transportation Poll, Texas A&M Transportation Institute

Table 1. Comparison of selected demographic variables between public transportation commentators and all respondents statewide

TRAVEL BEHAVIOR AND OPINION

In addition to representing a slightly different range of socio-demographic characteristics, respondents who commented regarding public transportation differed from the overall population of Texans in the travel behavior and opinions (see Table 2).

Not surprisingly, they were far more likely to use public transit as their primary mode of transportation. Of all respondents to the 2014 Texas Transportation Poll, only 4 percent reportedly use public transportation as their primary means of transportation, compared with 17 percent of those whose comments fell into the public transportation category. They were also twice as likely to have used public transit in Texas within the previous 30 days – 40 percent of those who commented regarding public transportation reported having used public transportation in Texas in the last 30 days, compared to just 20 percent of the overall population.

Table 2. Comparison of selected travel behaviors between public transportation commenters and all respondents statewide

	Statewide (n=5,153)		Sample (n=369)	
	n	%	n	%
What is your primary means of transportation?				
Auto (incl. motorcycle)	4,776	93%	277	75%
Public transportation	201	4%	64	17%
Bicycle	32	1%	1	0%
Walking	92	2%	15	4%
Other	52	1%	12	3%
Have you used public transportation to make at least one trip in the last 30 days in Texas?				
No	4,106	80%	223	60%
Yes	1,047	20%	146	40%

Source: 2014 Texas Transportation Poll, Texas A&M Transportation Institute

Table 2. Comparison of transportation behavior of statewide respondents and public transportation commentators

Questions regarding opinion of travel options revealed a significant difference in the opinion of the overall population and those who commented regarding public transportation in their region. Respondents who had commented regarding public transportation were slightly more likely to feel that public transportation is available in

their region whereas one quarter of all Texans strongly disagreed with the statement, as displayed in the following figure.

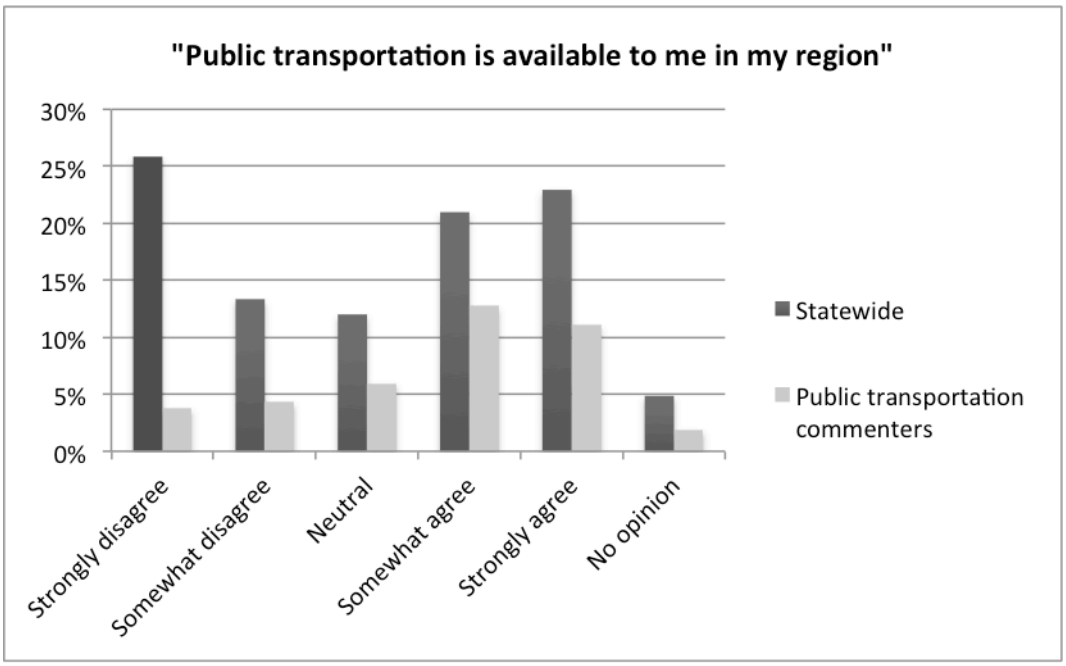


Figure 6. Responses to the statement "Public transportation is available to me in my region"

Likewise, when asked to provide their level of agreement toward the statement "Taking public transit is convenient in my region," a majority of Texans disagreed with the statement whereas a higher percentage of the respondents who commented regarding public transportation agreed with the statement, as shown in Figure 7.

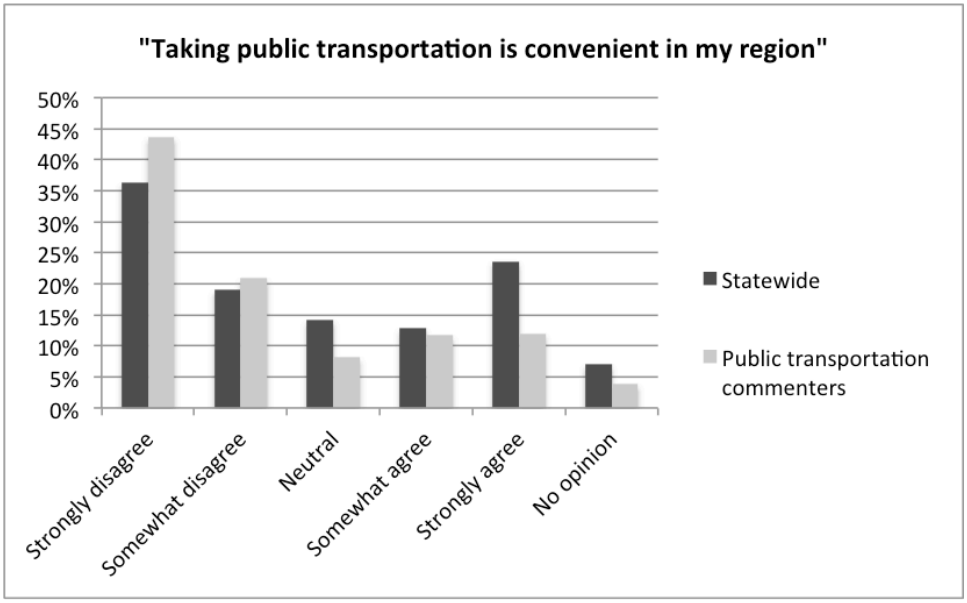


Figure 7. Responses to the statement "Taking public transportation is convenient in my region"

Finally, respondents who commented regarding public transportation were far more likely to support additional funding for public transportation at both state and regional level, as indicated in Figure 8 and Figure 9. These survey questions provide additional background on the opinions of respondents who commented regarding public transportation when given the opportunity to speak freely about transportation issues. The data suggest that comments regarding public transportation tend to come from respondents who are more frequent users of and are more supportive of funding for public transportation than most Texans.

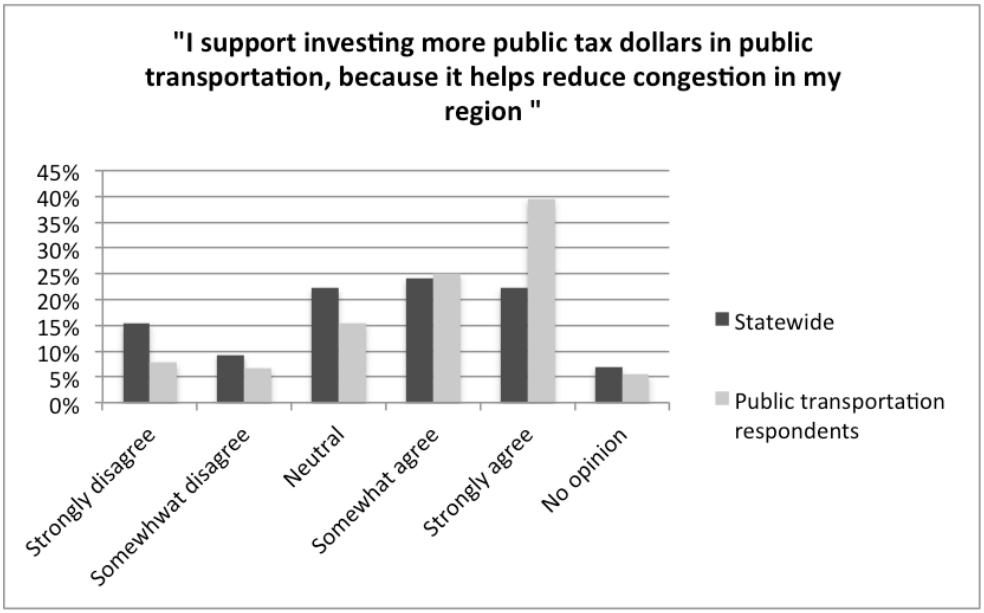


Figure 8. Responses to the statement "I support investing more public tax dollars in public transportation, because it helps reduce congestion in my region"

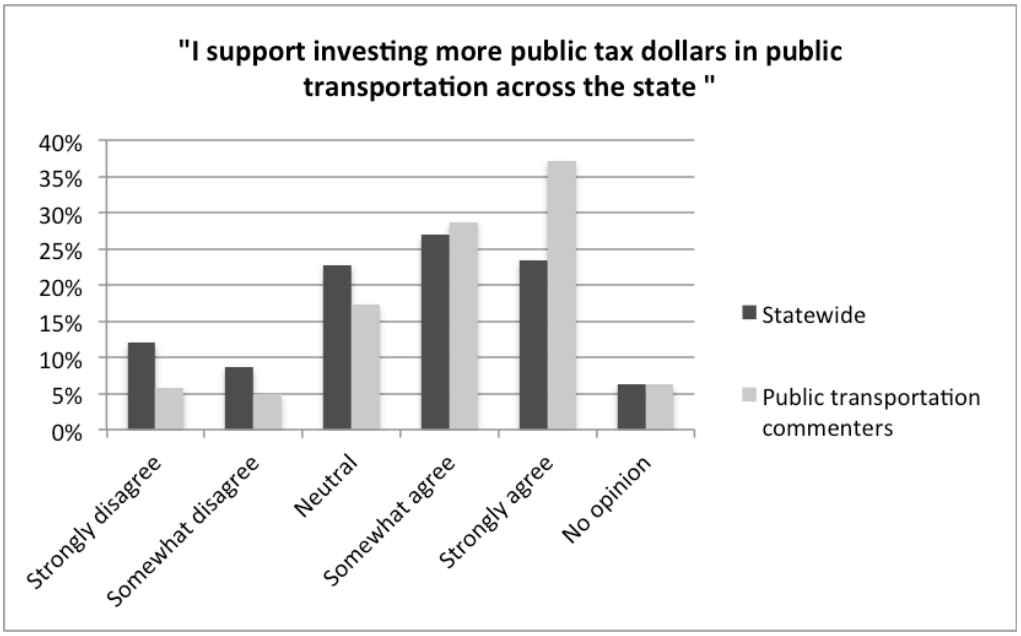


Figure 9. Responses to the statement "I support investing more public tax dollars in public transportation across the state"

QUALITATIVE ANALYSIS OF STATEWIDE PUBLIC TRANSPORTATION COMMENTS

Review of individual responses offers a greater understanding of respondents' point of view. The majority of comments regarding public transportation were simple, stating: "*public transportation*" or "*busses*" without offering further description of the issue. Other comments were more descriptive, offering additional insight into the public's most common issues concerning public transportation. Many comments regarding public transportation called for additional facilities or increased access to public transit, while some also offered specific fixes to improve transit service for certain populations or locations. The word cloud in Figure 10 reveals commonly used words to describe the issue of public transportation statewide. Many respondents used the words "lack" and "enough," indicating that availability of public transportation is a common issue for respondents. Interestingly, the word cloud shows that comments tended to focus on busses, while rail and trains were less prominent.

Figure 10. Public transportation word cloud results

Using the same methodology used to evaluate the entire volume of responses to the open-ended question, the responses in the public transportation node were categorized into sub-categories. The top four most frequently cited public transportation issues were:

- availability issues,
- service issues,
- traffic and other inconveniences, and
- other.

The following graph illustrates the frequency of each of the main issues.

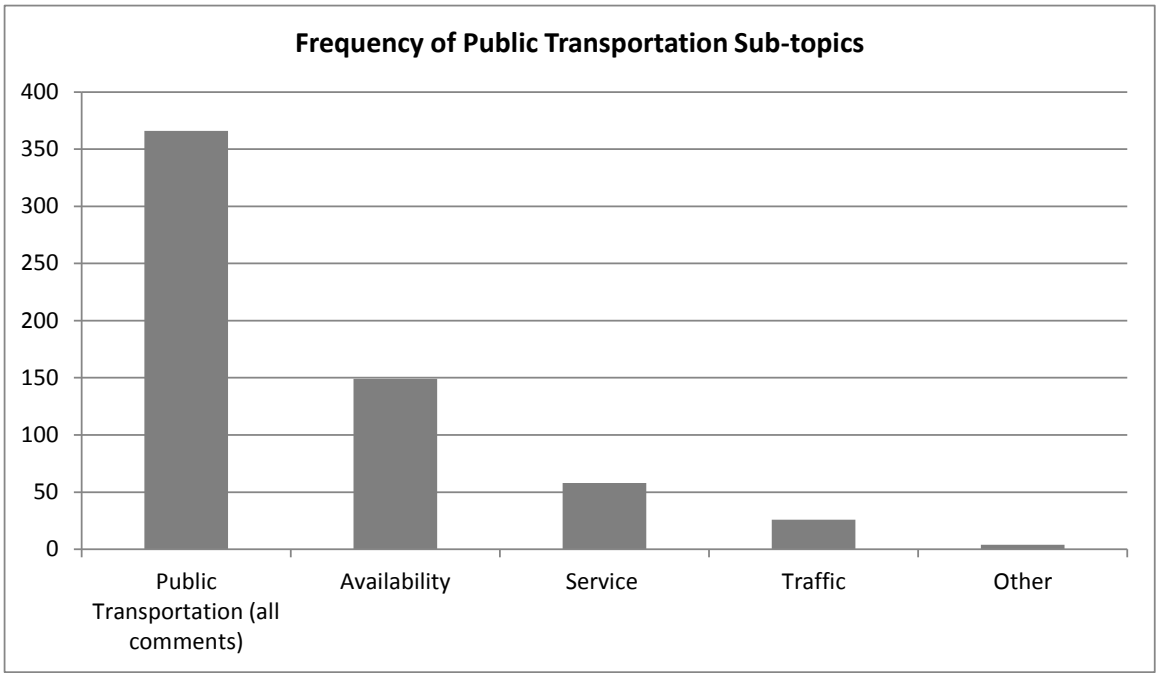


Figure 11. Frequency of public transportation sub-topics mentioned

The following map illustrates the geographic locations of each of the main categories of public transportation comment.

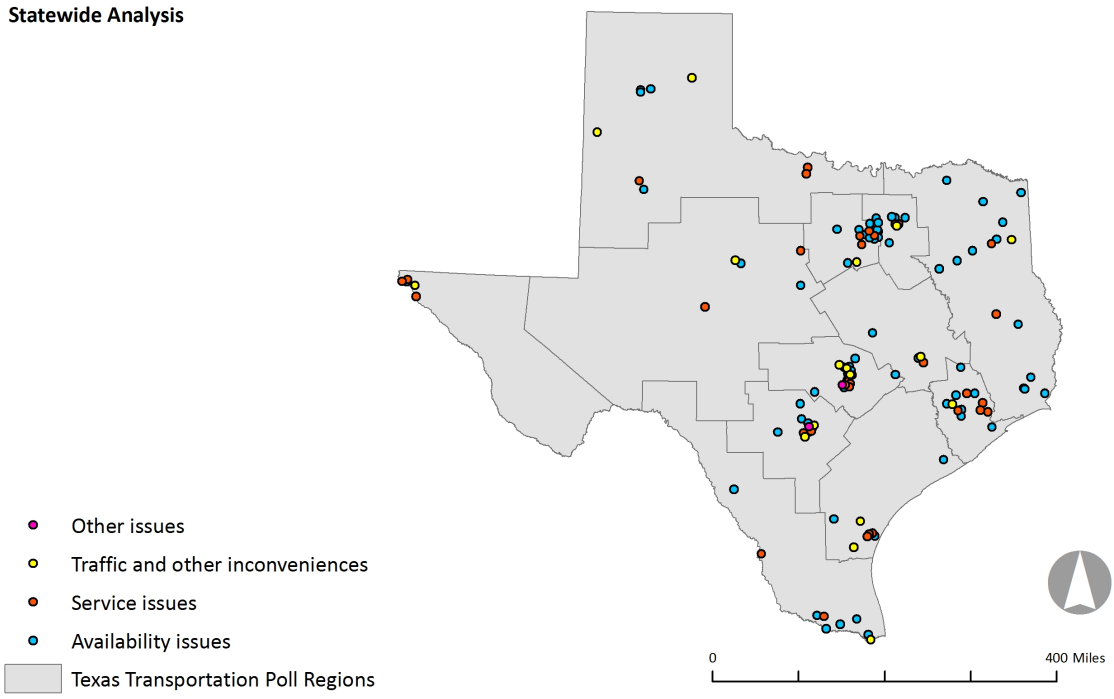


Figure 12. Geographic location of comments regarding public transportation by category

Each of the main issues related to public transportation are discussed below.

Availability

As illustrated in the word cloud, the most common word used to describe public transportation issues was "lack," indicating that many respondents feel that the biggest issue facing them in their region is a lack of public transportation and related mobility options. Issues having to do with public transportation availability were the most frequent sub-topic, garnering 148 unique comments across the state. Below are several examples of typical comments in this category:

"*Not enough affordable public transit options*." (male, 25-34, Williamson Co.)

"*Lack of comprehensive public transport which presents a practical alternative to driving a car*." (male, 35-44, Travis Co.)

Additionally, many respondents point out specific gaps in the availability of transit options, as seen in the following comments:

"*No public transportation in suburbs/rural areas*" (female, 25-34, Williamson Co.)

"*Lack of public transportation for the elderly*." (male, 55-64, Kerr Co.)

The following map shows the geographic location of all comments regarding availability issues statewide.

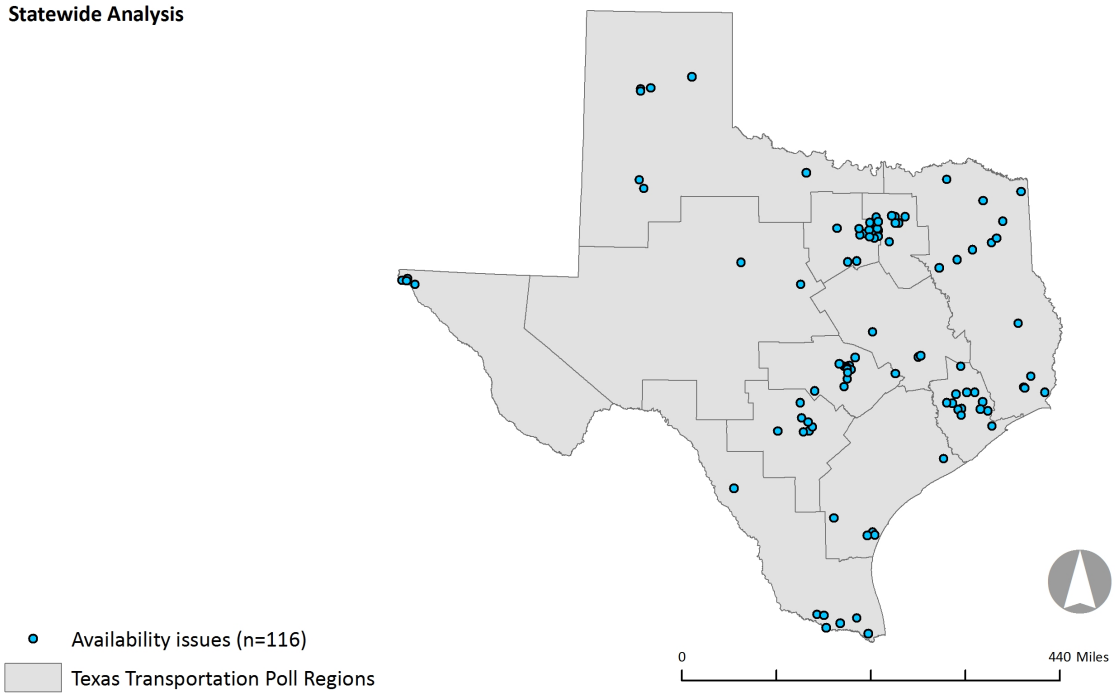


Figure 13. Geographic location of comments regarding availability of public transportation

Service

Beyond a lack of public transportation options, many respondents gave specific feedback regarding public transportation service. In total, 44 respondents provided unique

comments regarding public transportation service issues. For example, one respondent notes a gap in service in the early morning and late night in the San Antonio region:

"*Busses not operating late enough at night or early enough in the morning*." (female, 35-44, Bexar Co.)

Another respondent relays a different set of challenges addressing public transportation:

"*As an ecologically minded person, I would love to take Public Transportation, however, I don't feel safe where I work after dark*." (female, 25-34, Collin Co.).

This respondent notes concerns with personal security. This could be related to a local workplace neighborhood, or be a more general comment about her concerns about the security of transit systems.

The geographic distribution of issues regarding public transportation services are shown in the following map.

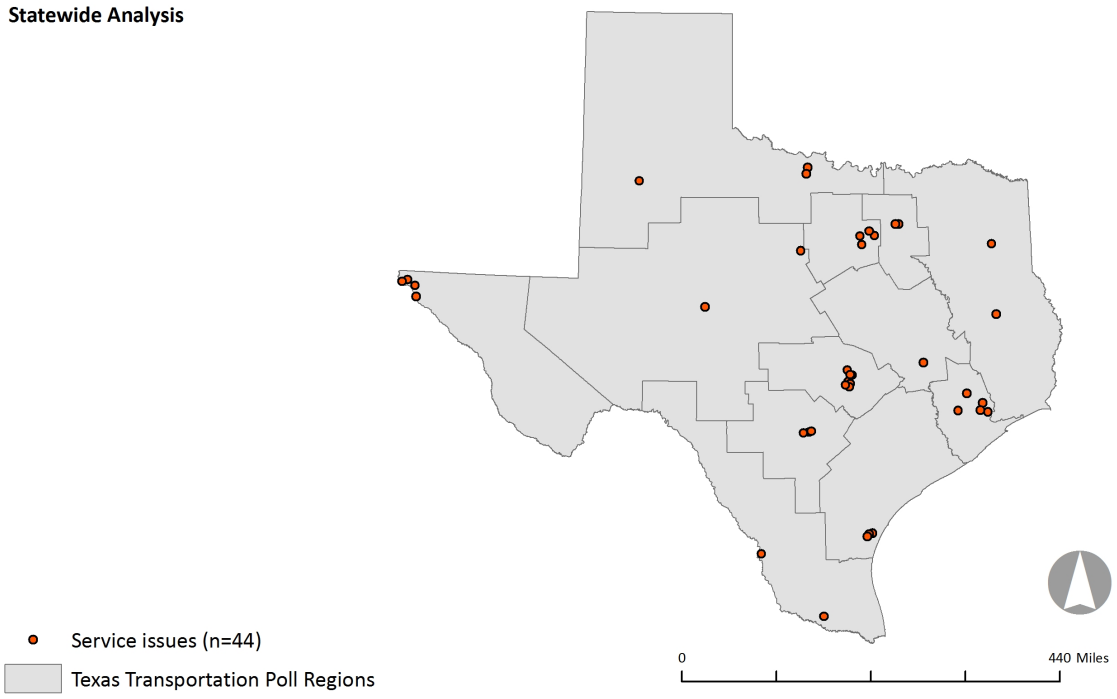


Figure 14. Geographic location of comments regarding public transportation service

Traffic and other inconveniences

A small handful of respondents mentioned public transportation as it relates to other transportation issues affecting them personally in their region. In sum there were 19 unique comments that fell into the traffic category. For example, one respondent commented:

> "*all of the buses that stop and start to drop off people or pick up people cause traffic jams behind the buses*" (female, 18-24, Cameron Co.)

This respondent is not concerned with the availability of public transportation or the level of service, instead, she is unhappy with the perceived delay caused by busses on the roadways. Comments regarding traffic and other inconveniences as a result of public transportation are illustrated in the following map.

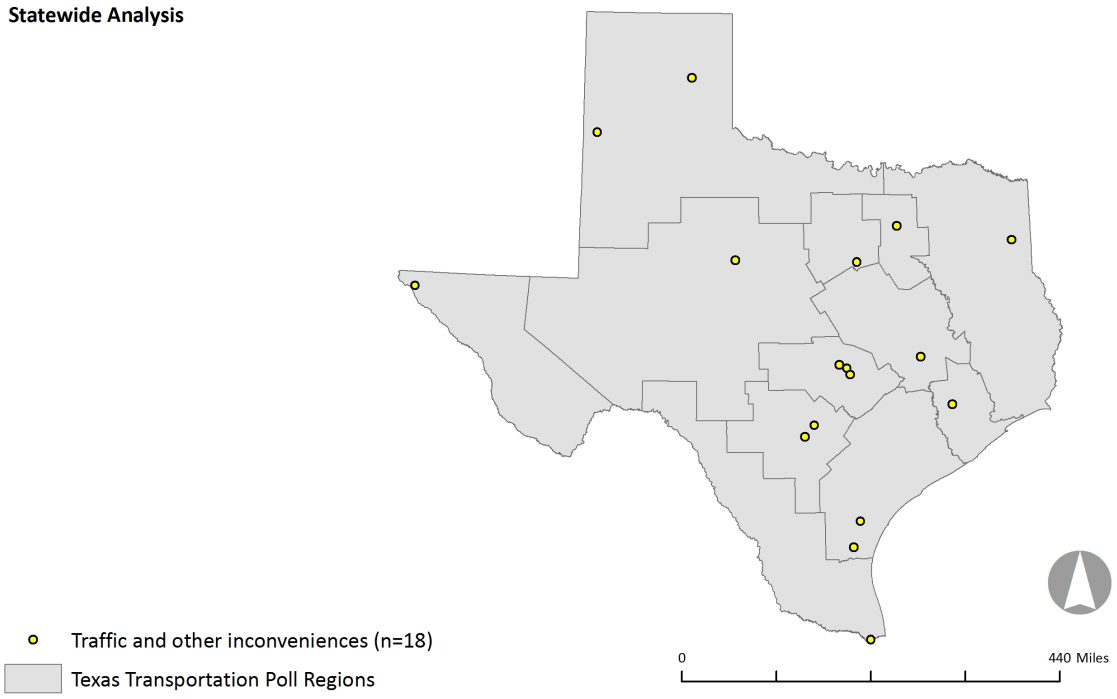


Figure 15. Geographic location of comments regarding traffic and other inconveniences caused by public transportation

Other

Comments which offered some background, but did not fall into the above issues, were categorized as other. There were also a large number of comments which stated simply "bus" or "busses;" these comments were omitted from this analysis. Once those were omitted, the number of comments regarding other issues was just two – one in the Austin region and one in the San Antonio region:

"*No need for rail in San Antonio. Nobody rides the trollys downtown*" (male, 55-64, Bexar Co.)

"*lack of responsible planning / "If you DON'T built it they WON'T Come" / More emphasis on trains dispite what the voters have said. Political agendas, influx of*

foreigner (CA, IL, MI, NY, etc) from other parts of the country." (male, 55-64, Travis Co.)

Both of these respondents appear to be opposed to rail due to a perceived lack of demand in their region. The following map depicts the locations of the two comments regarding other issues with public transportation.

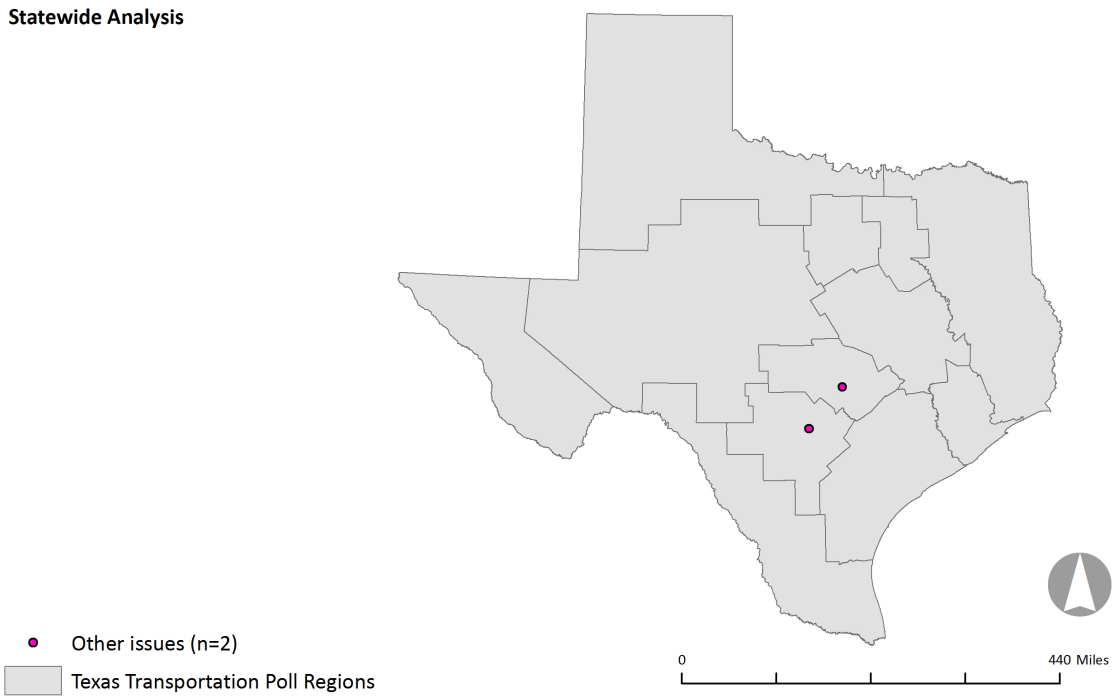


Figure 16. Geographic location of comments regarding other issues regarding public transportation

SENTIMENT ANALYSIS

Sentiment analysis allows for a more nuanced understanding of whether Texans feel positively or negatively towards a particular issue, and by what magnitude. In this instance, the question "what is the most significant transportation issue affecting you personally in your region?" elicited responses that would be inherently negative, by

asking respondents to highlight issues rather than asking for different feedback such as solutions, or suggestions. Therefore, this sentiment analysis reflects the degree of negativity used to describe transportation issues facing Texans in their regions. Sentiment was measured using LIWC, an empirically validated linguistic software to infer psychological and/or emotional reactions. A negative sentiment score indicates that comments contained mostly negative words, a positive score indicates that comments were expressed using positive words, and a score of zero indicates that comments were expressed using neutral words.

Public transportation was one of the few categories which had a positive sentiment score (0.055), as shown in Figure 17 which illustrates the average sentiment score for each of the ten topics found in all of the responses to the open-ended question.

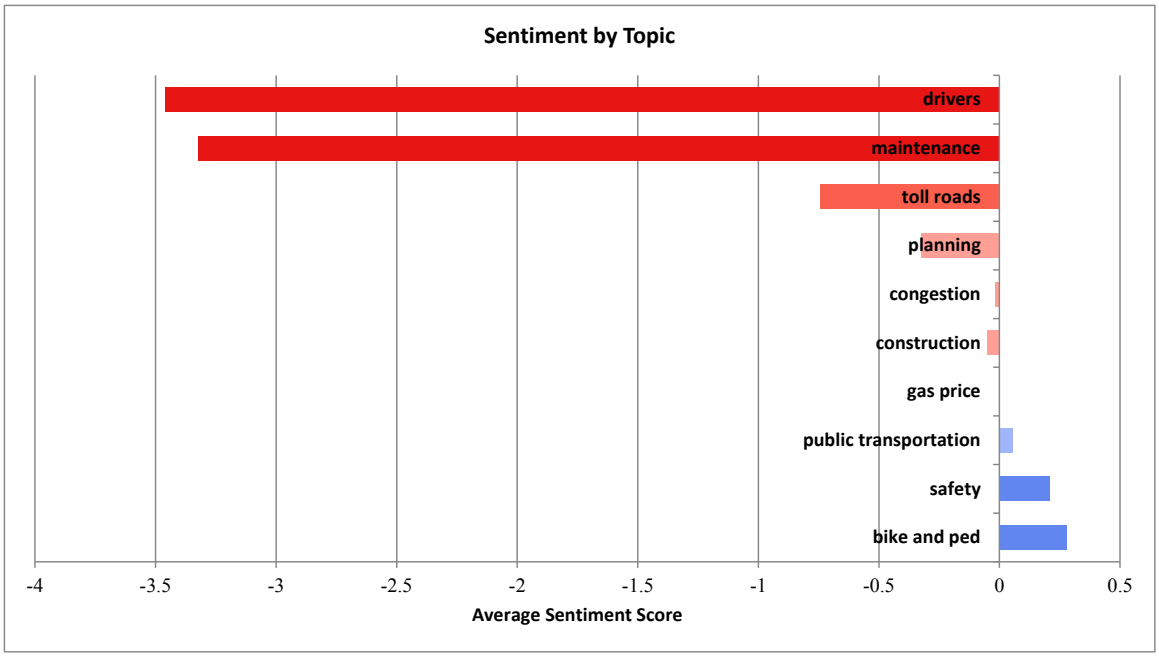


Figure 17. Average sentiment score by topic for all responses

Public transportation was one of the few topics that garnered an average sentiment score higher than zero, indicating that people tended to use positive words to describe the issue of public transportation in many regions. When aggregated by region, average sentiment toward public transportation can be seen to vary across the state, illustrated below in Figure 18. The highest sentiment score (0.64) was in the El Paso region, while the lowest (-0.70) was in the Houston region.

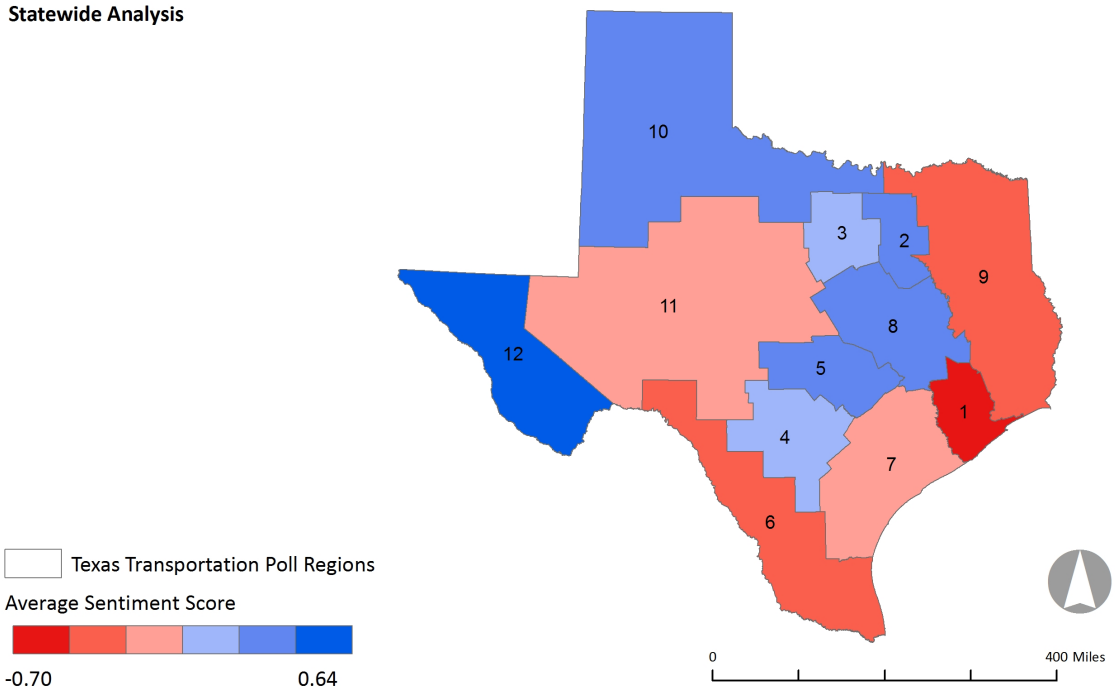


Figure 18. Average sentiment of public transportation comments by region

Of the sub-topics identified in the public transportation comments, availability garnered the highest sentiment score (1.02), service garnered the second highest (0.7), and the remaining sub-topics scored zero, as shown in Figure 19.

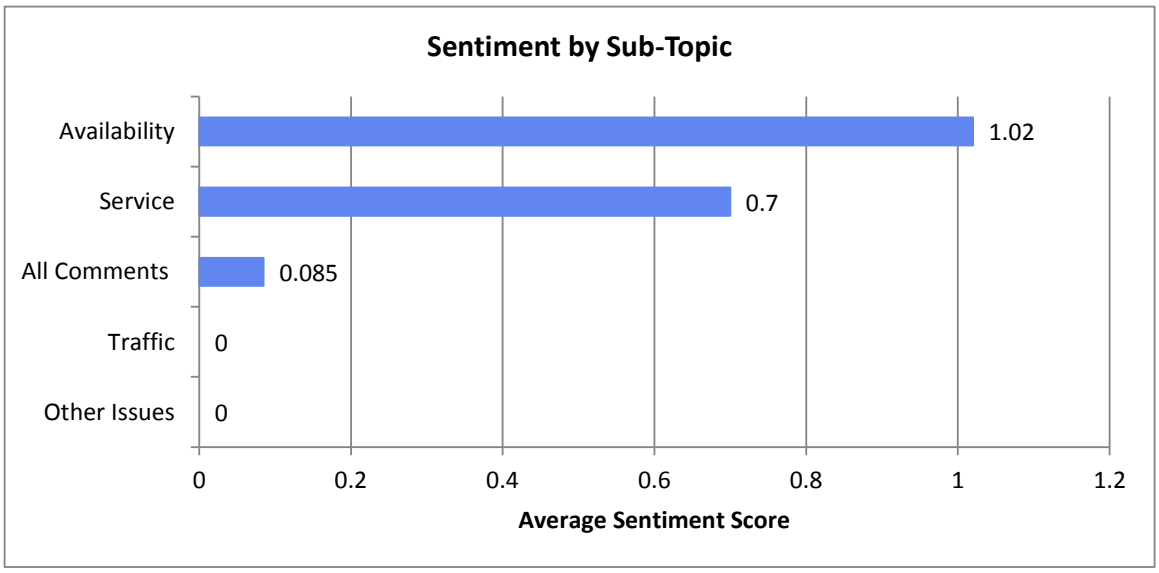


Figure 19. Average sentiment toward public transportation sub-categories

The following map displays the geographic location of the top four most frequently cited public transportation issues, overlaid with the average sentiment for each region.

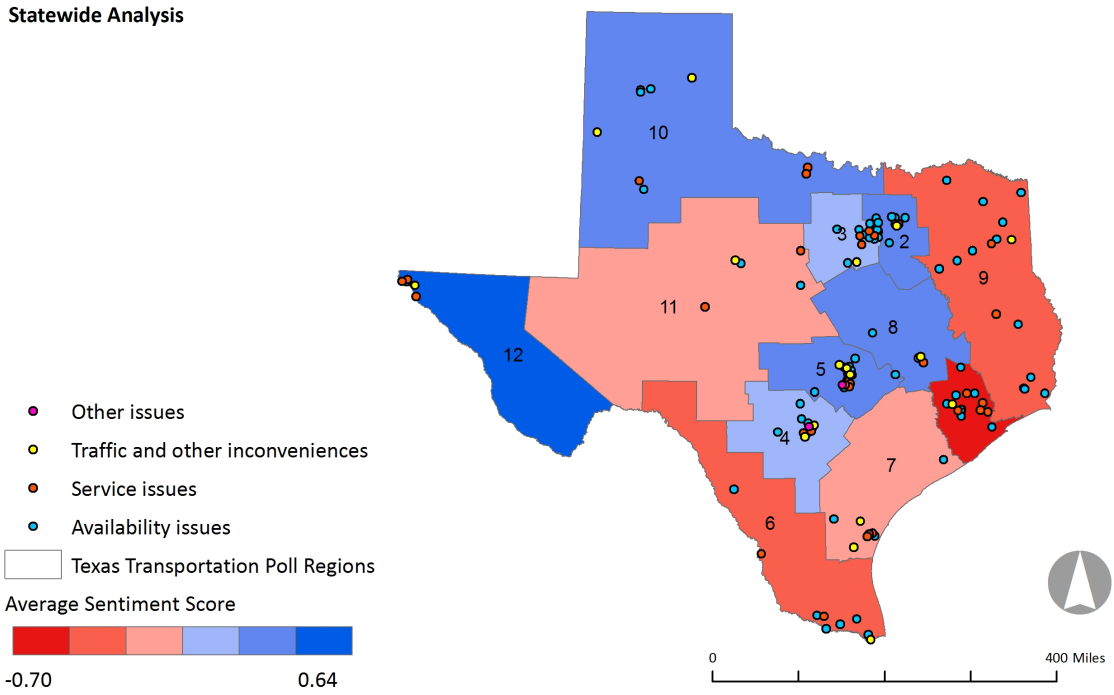


Figure 20. Sentiment analysis and geographic location of comments regarding public transportation by category

Chapter 5: Local Sentiment toward Public Transportation

Local results of the Texas Transportation Poll are presented for the Austin region in this chapter, including socio-demographic analysis, opinion and travel behavior, and geographic analysis of comments. Due to the relatively small sample of comments regarding public transportation in the Austin region, sentiment analysis was not possible at this scale. This chapter also presents a comparison of public transportation comments with existing public transportation services in the region and results from the 2014 urban rail bond election.

LOCAL TEXAS TRANSPORTATION POLL RESULTS

Local analysis is focused on results from the Texas Transportation Poll in the Austin region (Region 5), which is highlighted in the map below.

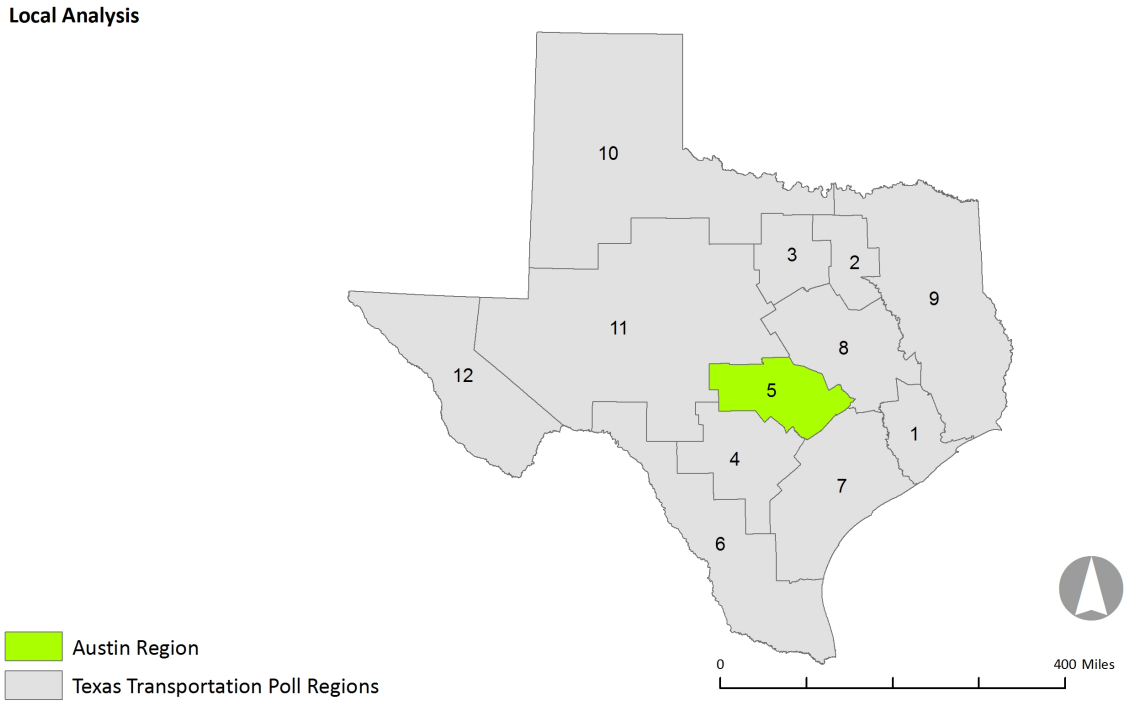


Figure 21. Austin region location map

Region 5 encompasses 11 counties in total – Mason, Gillespie, Llano, Blanco, Burnet, Williamson, Travis, Hays, Bastrop, Lee and Caldwell. The Texas Transportation Poll measured the opinion of 494 respondents in the Austin region, roughly ten percent of whom provided comments regarding public transportation. The following map shows the geographic location of all responses received in the Texas Transportation Poll in Region 5, with comments regarding public transportation highlighted in pink.

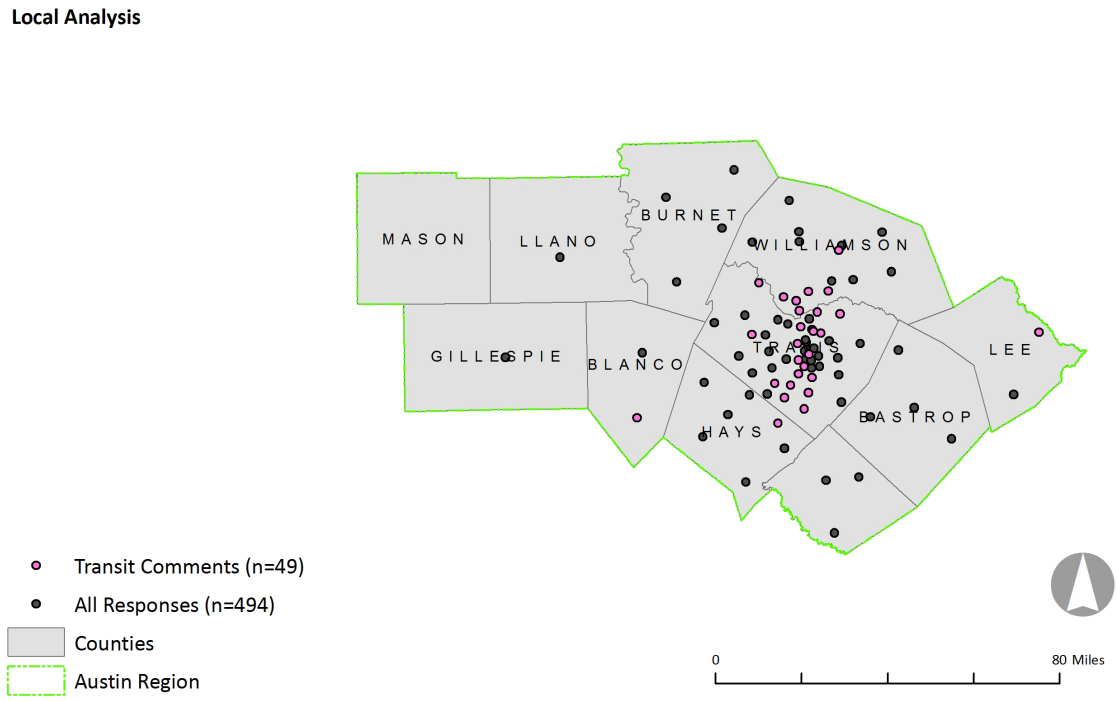


Figure 22. Location of all responses and public transportation comments in the Austin area

Comments regarding public transportation are clustered in the zip codes in central Travis County and decrease in number farther from the center of the region, as shown in Figure 22, therefore analysis for the region will be mainly focused on Travis and Williamson counties. The locations of comments in each of the four sub-categories of

public transportation comments (availability issues, service issues, traffic and other inconveniences, and other comments) are shown in Figure 23 below.

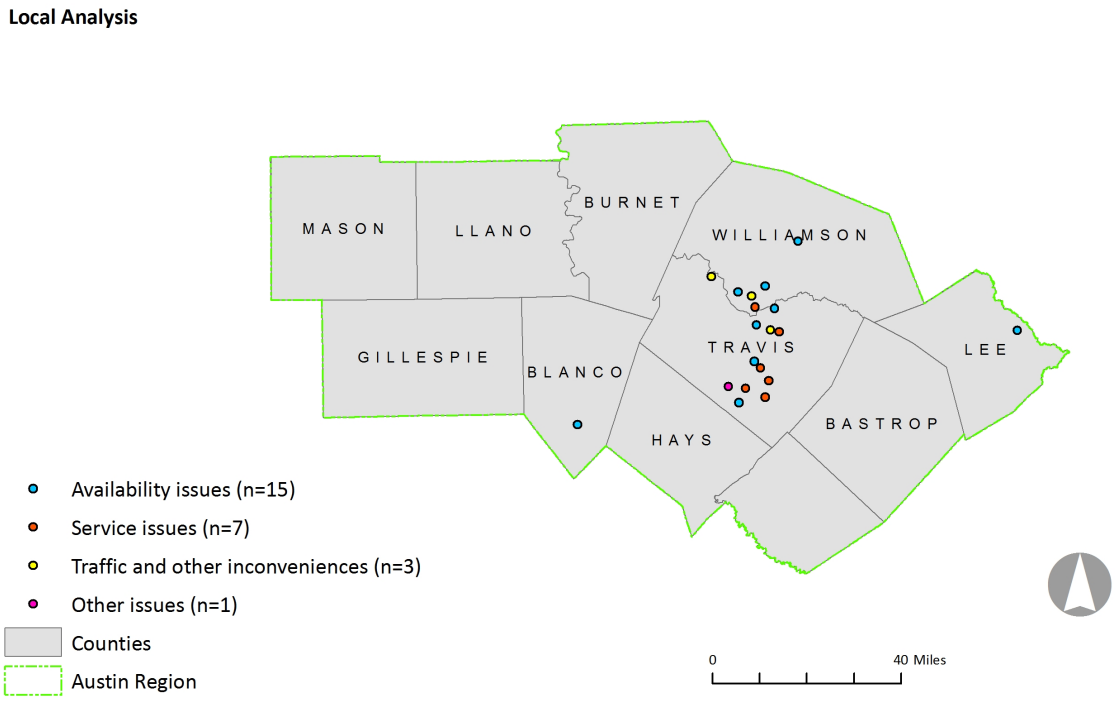


Figure 23. Austin region public transportation comments by sub-category

SOCIO-DEMOGRAPHIC ANALYSIS

Table 3 compares selected socio-demographic variables of respondents in the Austin region with those who commented regarding public transportation in the open-ended question (referred to as "sample" in the table below). Similar to statewide results, respondents who commented regarding public transportation differed from the overall population in the Austin region. Public transportation commentators were again more likely to be female and more likely to be Hispanic of African American. They tended to be either younger or older than the general population in the region. Respondents

concerned with public transportation were also found to have lower household incomes than the regional population and a slightly higher level of education.

Table 3. Comparison of selected demographic variables between public transportation commenters and all respondents in Austin region				
	Austin district (n=551)		Sample (n=51)	
	n	%	n	%
Sex				
Male	257	47%	22	43%
Female	293	53%	29	57%
Age				
18-24	47	9%	6	12%
25-34	139	25%	17	33%
35-44	105	19%	7	14%
45-54	102	19%	7	14%
55-64	111	20%	13	25%
65+	57	10%	1	2%
Race/Ethnicity				
Hispanic	138	25%	16	31%
White	355	64%	27	53%
Black or African American	39	7%	7	14%
American Indian or Alaskan Native	3	1%	0	0%
Asian	15	3%	1	2%
Other	1	0%	0	0%
Income				
Less than $25,000	81	15%	10	20%
$25,000 to $74,999	246	45%	25	49%
$75,000+	224	41%	16	31%
Education				
Less than high school	11	2%	0	0%
High school diploma/GED	84	15%	10	20%
Some college or associates/technical degree	171	31%	15	29%
Bachelor's degree or higher	285	52%	26	51%

Source: 2014 Texas Transportation Poll, Texas A&M Transportation Institute

Table 3. Comparison of selected demographic variables between public transportation commenters and all respondents in Austin region

TRAVEL BEHAVIOR AND OPINION

Differences and similarities in travel behavior and opinion in the Austin region mirrored statewide results discussed in Chapter 4. Respondents who commented regarding public transportation differed from the overall population in the Austin region in their travel behavior and opinions, as shown in Table 4. They were far more likely to use public transit as their primary mode of transportation. In the Austin region, only five percent of respondents report using public transportation as their primary means of transportation, compared with 18 percent of those whose comments fell into the public transportation category. They were also much more likely to have used public transit in Texas within the previous 30 days – 59 percent of those who commented regarding public transportation reported having used public transportation in Texas in the last 30 days, compared to just 24 percent of the overall population in the Austin region.

Table 4. Comparison of transportation behavior of statewide respondents and public transportation commentators

	Austin district (n=551)		Sample (n=51)	
	n	%	n	%
What is your primary means of transportation?				
Auto (incl. motorcycle)	511	93%	41	80%
Public transportation	26	5%	9	18%
Bicycle	2	0%	0	0%
Walking	8	1%	0	0%
Other	4	1%	1	2%
Have you used public transportation to make at least one trip in the last 30 days in Texas?				
No	420	76%	21	41%
Yes	132	24%	30	59%

Source: 2014 Texas Transportation Poll, Texas A&M Transportation Institute

Table 4. Comparison of transportation behavior of statewide respondents and public transportation commentators

The following figures illustrate local public opinion of public transportation service in a variety of ways. Figure 24 shows the majority of respondents in the Austin region reported that taking public transportation is not convenient in their region, particularly those who commented regarding public transportation in the open-ended question.

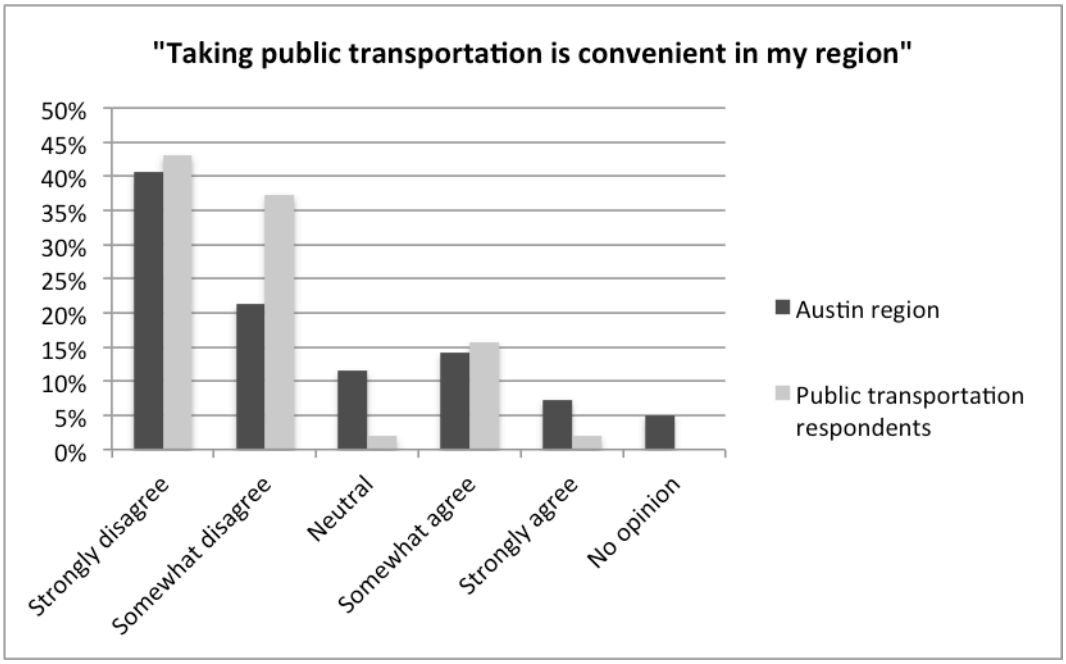


Figure 24. Local responses to the statement "Public transportation is convenient in my region"

Interestingly, respondents offered mixed responses regarding the availability of public transportation in their region, indicating a variety of levels of accessibility across the region as shown in Figure 25. Though many Austin area respondents noted that public transportation is available to them, the data indicate that even in places where public transportation is available, it is not considered very convenient to use.

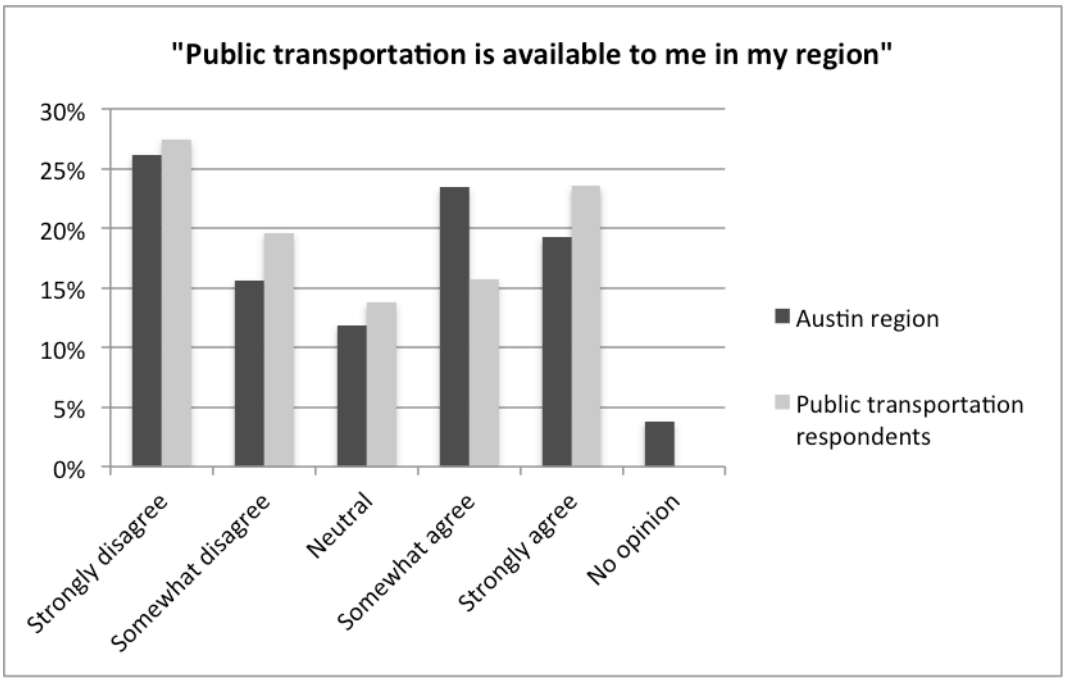


Figure 25. Local responses to the statement "Public transportation is available to me in my region"

Austin region respondents predominantly support additional funding for public transportation services both in their region and statewide, as seen in Figure 26 and Figure 27. Support for investing more public tax dollars in public transportation at both statewide and regional levels was highest among respondents who commented regarding public transportation. This was to be expected, as respondents commenting on public transportation were previously shown to be more reliant on public transportation as their primary mode. It is also noteworthy that through qualitative analysis and categorization of comments, it was possible to identify the most frequent users of public transportation.

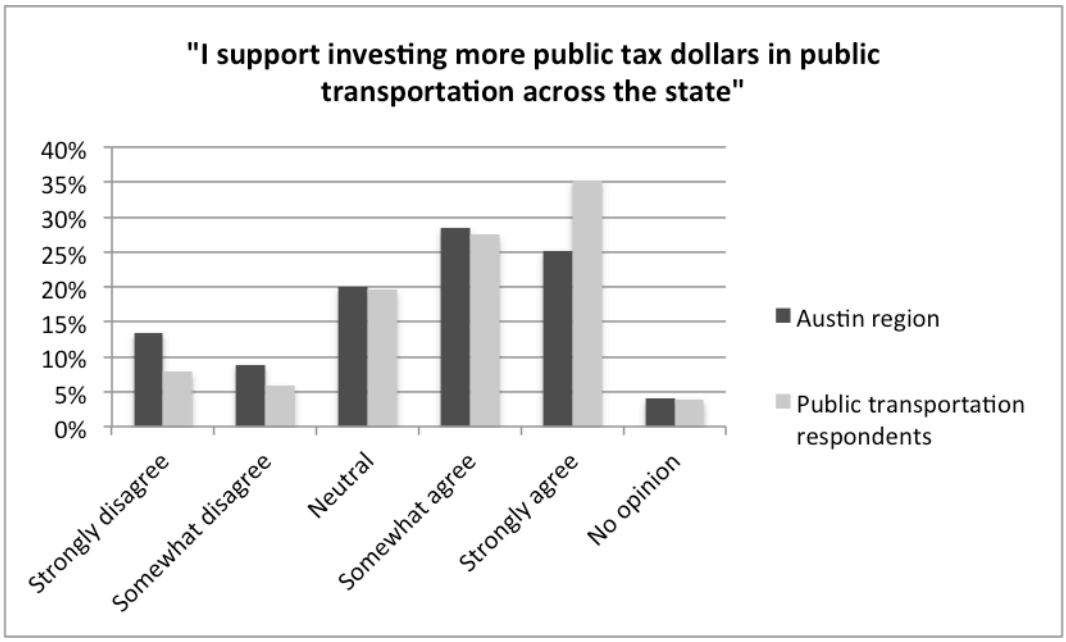


Figure 26. Local responses to the statement "I support investing more public tax dollars in public transportation across the state"

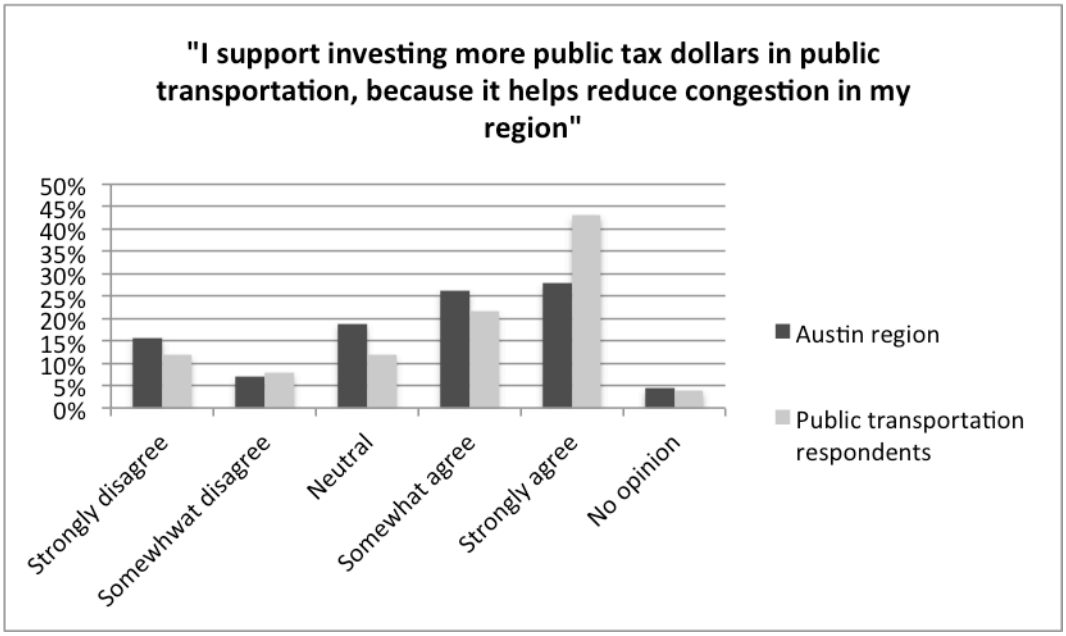


Figure 27. Local responses to the statement "I support investing more public tax dollars in public transportation across the state"

QUALITATIVE ANALYSIS OF LOCAL PUBLIC TRANSPORTATION COMMENTS

One of the primary aims of this study is to determine whether open-ended comments received through the statewide Texas Transportation Poll, which are statistically representative of the viewpoints of the population of registered voters in Texas, provide meaningful insight into the public transportation-related needs and desires of Texans. This section compares existing public transportation conditions with the comments received from respondents regarding public transportation in order to validate or find areas of disagreement in the responses received.

The Capital Metropolitan Transportation Authority (CapMetro) provides fixed-route bus, demand-response transit, and commuter rail service in the urbanized Austin area. In the following figures, the U.S. Environmental Protection Agency (EPA)'s transit accessibility metric is used as an estimate of the relative transit access of respondents in their reported zip codes and to delineate the CapMetro service area boundaries.

Outside of the CapMetro service area, Capital Area Rural Transportation System (CARTS) provides regional transportation for the non-urbanized areas of Bastrop, Blanco, Burnet, Caldwell, Fayette, Hays, Lee, Travis, and Williamson Counties, as well as the San Marcos urbanized area. Together, CapMetro and CARTS comprise all existing public transportation options for residents in the Austin region as defined by the TTP. Each of the sub-categories of public transportation comments will be compared with these existing transit services in the following sub-sections.

Availability

Comments regarding availability of public transportation provided the most insight in the Austin area. As shown in Figure 28 they tended to be located in zip codes on the outskirts of the CapMetro Service Area. Two comments were located in rural zip codes that correspond with the City of Blanco in Blanco County and the City of Dime

Box in Lee County. Both of these rural towns are far from the CapMetro service area and do not fall into the CARTS service area. The remaining comments tended to be clustered toward the northern edge of CapMetro's service area, in zip codes corresponding with Cedar Park, Round Rock, and Pflugerville. Several were not in the CapMetro service area, but would fall into the CARTS service area. As seen in Figure 28, those areas have the lowest transit accessibility.

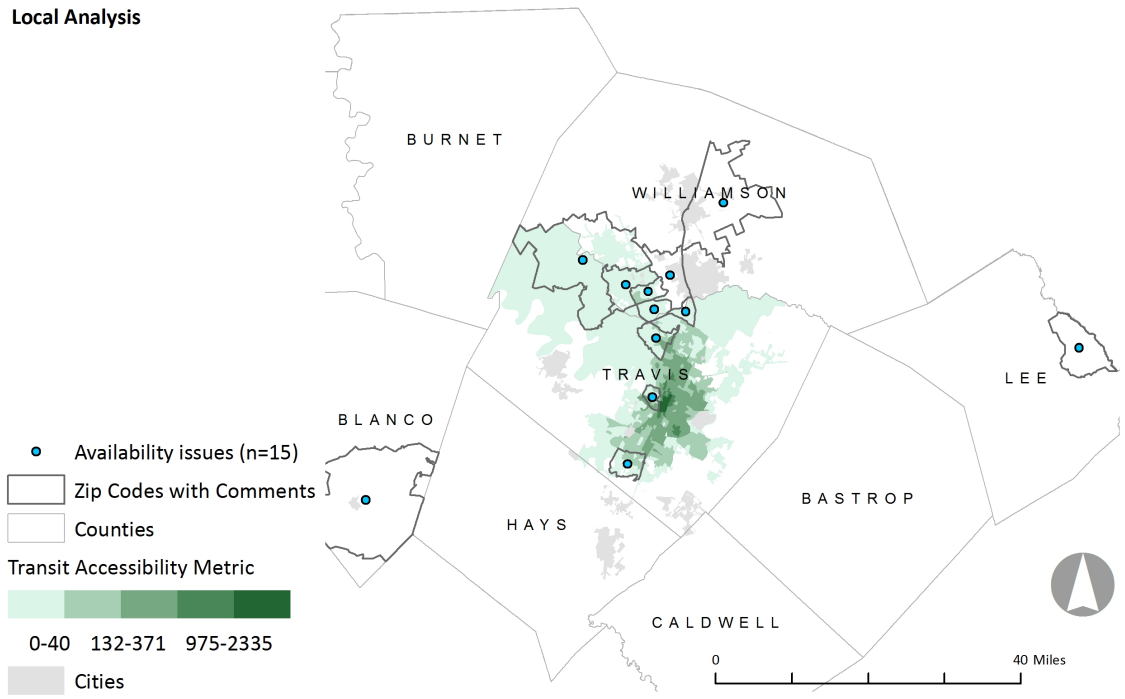


Figure 28. Comparison of public transportation availability issues and transit accessibility in Austin region

It is important to note that the location of the comments is not exact, but tied to the centroid of the respondents' zip code. Therefore, comments such as the one seen in the west straddling Travis and Williamson Counties may or may not be from a respondent who is located within the service area.

Service

Comments regarding service issues in the Austin region were fairly general. All of the comments regarding service issues in the Austin region fell within the CapMetro service area, as shown below in Figure 29. While the location of these comments is notable, the text of these comments did not provide specific insights into service issues or gaps. Additionally, the transit accessibility can be seen to vary within the respondent provided zip codes where service-related comments were submitted, with the exception of the comment that is from a respondent in downtown Austin, where the accessibility of public transportation is highest.

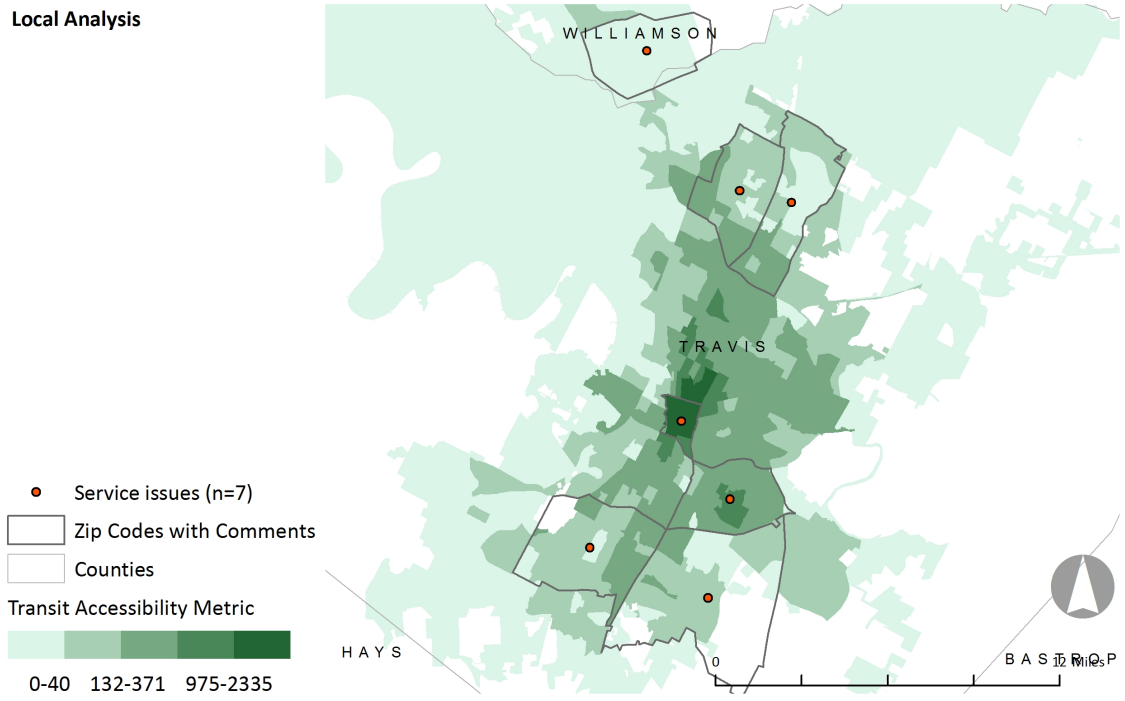


Figure 29. Comparison of public transportation service issues and transit accessibility in Austin region

Traffic and other inconveniences

Comments regarding traffic and other inconveniences were the least meaningful in the Austin region, stating only "*buses*," and were therefore excluded from further analysis.

Other

One respondent in the Austin region offered commentary regarding other public transportation issues. Interestingly, this comment alludes to the urban rail proposal that was being debated at the time the poll was conducted:

> "*lack of responsible planning / "If you DON'T built it they WON'T Come" / More emphasis on trains dispite what the voters have said. Political agendas, influx of foreigner (CA, IL, MI, NY, etc) from other parts of the country*." (male, 55-64, Travis Co.).

This comment also mentions political agendas as an issue. Despite being the only comment in this category, this comment provides interesting insight into public sentiment regarding political issues and will be discussed in the following section regarding Austin's urban rail proposal. This respondent was located in southwest Austin.

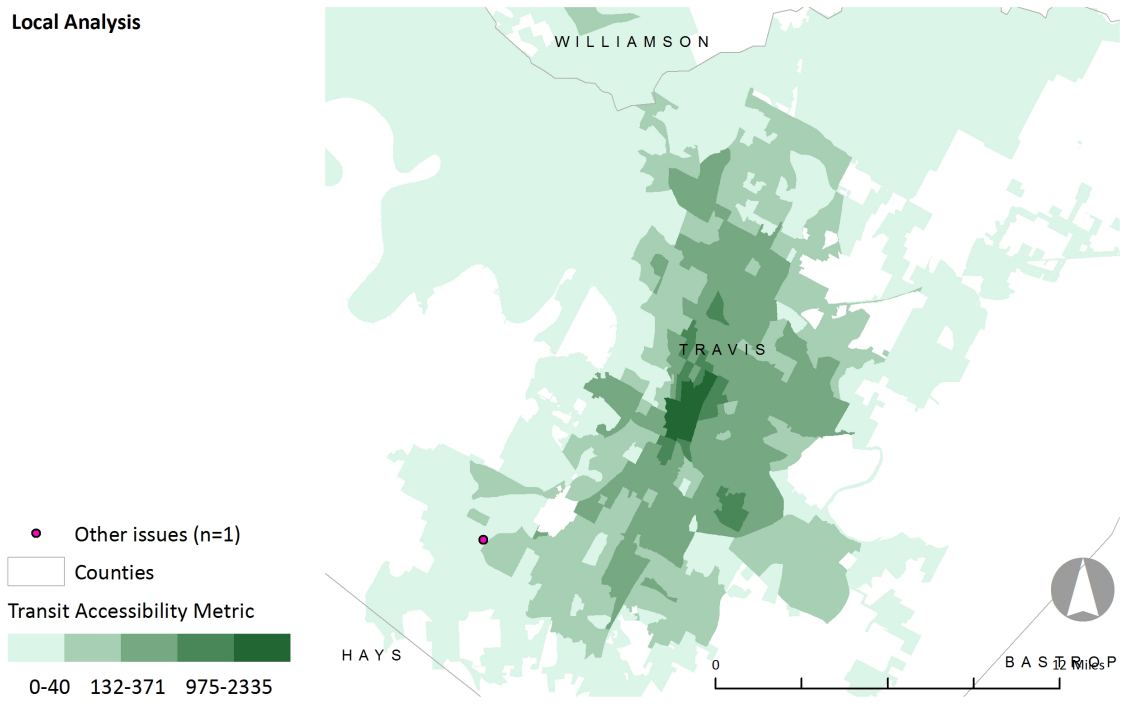


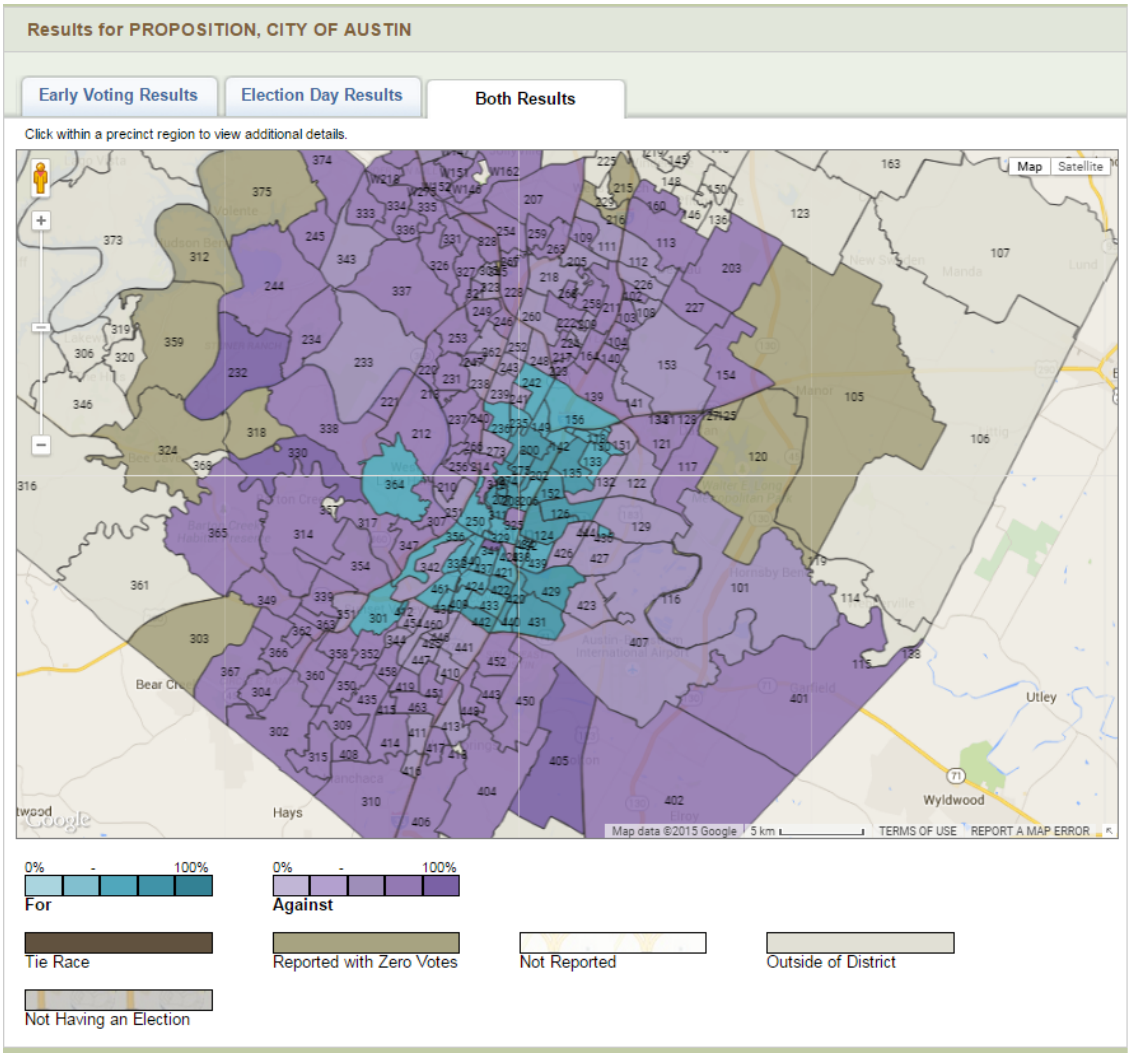
Figure 30. Comparison of other public transportation issues and transit accessibility in Austin region

Comments in the Austin region regarding lack of access to public transportation tended to align with low levels of transit accessibility, as measured by the EPA's Smart Location Database metric. Most comments regarding availability mentioned limited availability as a major issue; these respondents tended to be located in zip codes with lower transit accessibility scores. Dissatisfaction with transit service, as evidenced in comments regarding public transportation service issues, aligned with existing CapMetro transit service in the Austin area. However, these comments were found to lack substance and therefore did not provide meaningful insight or indicate areas where transit service was actually a problem. The issue of traffic and other inconveniences due to public transportation did not provide meaningful insight locally, possibly due to the small sample size of comments in this category in the Austin area.

AUSTIN'S 2014 URBAN RAIL PROPOSAL

In the fall of 2014, voters in the Austin area were presented with a $1.38 billion bond proposal that would have created an urban rail line and funded road improvements as part of the Project Connect plan for regional mobility (Huber, 2014). Project Connect began outreach efforts as early as 2013 to solicit public opinion on the proposed rail line and inform voters. However, the urban rail proposal faced unique opposition from both sides: anti-rail voters were opposed to the bond package and overall government spending, while many pro-rail voters were unsatisfied with the proposed alignment of the rail line. The proposal was defeated with 42.8 percent for versus 57.2 percent against (Travis County Clerk, 2014).

There are undoubtedly many political, economic, and historic explanations for why the urban rail proposal was defeated in Austin. However, one interesting possible factor lies in the geographic distribution of voting results. A map of the election results (see Figure 31) published by the Austin-American Statesman shows that voters were more likely to vote yes to the proposal the closer they lived to the urban core. These results also correspond with the location of many of the comments regarding public transportation in the Austin region, which also tended to be located near the outskirts of the CapMetro service region.



Source: Travis County Clerk

Figure 31. Results for Proposition 1 by voter precinct

Many living in the outskirts of Austin, where voters were least supportive of the urban rail proposal, reported having limited public transportation options available to them. They were also more likely to comment regarding public transportation in the open-ended question. Furthermore, people who commented regarding public transit were more likely to rely on public transit, more likely to have ridden public transit in the last 30 days, and more likely to have reported that taking public transit is not convenient to

them. They were also the most likely to support spending additional public tax dollars on public transportation investments both in the state and region. Yet, their precincts overwhelming voted against the urban rail bond.

These variables alone do not appear to explain why the urban rail bond was voted down, especially based on the small size of the sample. However it may be possible to infer from that this limited dataset that these findings disprove the notion that those who choose to live outside of the urban core have also "voted with their feet" and chosen to live without public transportation access because they do not find it valuable. Instead, results from the Texas Transportation Poll show the opposite: as supporters of public transportation in general, residents of the outer precincts of Austin may have found fault in the proposal itself. In this finding, there lies hope for the future of public transportation in Austin.

Chapter 6: Discussion

IMPLICATIONS OF STUDY

The 2014 Texas Transportation Poll reveals many travel behaviors and opinions regarding public transportation of residents in both the Austin region and statewide. Statewide, the availability of public transportation is limited. Even with public transportation available, many in the Austin region still find it inconvenient to use public transportation.

These results do not seem to explain why the urban rail bond was voted down, but they do provide interesting insight into public sentiments regarding public transportation in the Austin region and statewide. For one thing, these analyses reinforce what we already knew: Austinites voted against the rail bond despite being supportive of increased public transportation services and being willing to finance them. Several conclusions can be drawn from this.

For one, these results point the way forward for future public transportation initiatives in the Austin region. People in the Austin region are supportive of public transit and believe that spending additional tax dollars on public transportation investments will help alleviate congestion in the region. Based on the level of support for public transportation expressed in the Texas Transportation Poll, there is still an opportunity for improving mobility through public transportation investments in the Austin region. To do so, agencies should capitalize on the high level of public support.

Many of the comments received in the Texas Transportation Poll point to specific zip codes where public transportation is unavailable, services are lacking, or other issues. Agencies should make a better effort to understand and address those issues when crafting public transportation initiatives, especially which require authorization of the use

of tax dollars by the public, in order to achieve the highest level of public support possible.

As this study has shown, it is possible to find common themes in a large volume of unstructured public opinion data. Though it may not always be feasible to conduct a large-scale representative opinion poll prior to every transportation initiative, agencies wishing to better incorporate public opinion can utilize a similar methodology to extract meaningful insights from data gleaned from Twitter, Reddit, Facebook, or other social media platforms. In addition to being a free and readily available source of qualitative data, a secondary benefit of the use of social media data is that public opinion can be tracked in real-time. This study has also illustrated the challenges of drawing meaningful insight from public opinion data that is non-representative of the entire population, which should always be kept in mind when utilizing non-representative data sources such as social media comments or small sample sizes.

Statewide, responses to the open-ended question "what is the most significant transportation issue affecting you personally in your region?" revealed several interesting trends. When given the opportunity to speak freely regarding transportation issues, nearly ten percent of Texans voiced their opinion regarding public transportation, indicating a high level of awareness of the issue among Texans. Of those, the two sub-categories that generated the most concern statewide were the availability of public transportation and issues regarding public transportation service. Many Texans also expressed support for increased funding for public transportation at the state level and within their own region. These results indicate statewide support for reallocation of transportation dollars to public transportation projects that expand the availability of public transportation and/or improve upon existing service. Similar to the findings in the Austin region, one of the best ways to ensure that public transportation projects and funding allocations are

supported by the public is to understand and integrate public opinion, as expressed through representative opinion polls or through other less official sources such as Twitter, in the planning and decision making process.

UTILITY OF SENTIMENT ANALYSIS AND QUALITATIVE ANALYSIS IN TRANSPORTATION RESEARCH

There were also several interesting implications for transportation research and analysis of public opinion that can be broadly applied outside of the Texas context. While the Texas Transportation Poll provides an understanding of Texan's views on transportation issues and solutions in aggregate, the verbatim responses from the open-ended question allow for a more nuanced understanding of not just *what* Texans think about these issues but *why*, in the exact language they use to describe their concerns.

Most public engagement methods and surveys target specific questions and issues to seek answers from the public. This helps ensure direct responses, but leaves little opportunity for asking other questions after the instrument is administered. Though people naturally think and relay information through narrative and storytelling, these methods do not always match well with methods that seek to quantify input. Qualitative methods, including sentiment analysis, allow exploration of new research questions with a static dataset, such as the Texas Transportation Poll. With an expanded qualitative analysis toolbox, we can continue to explore public input from different angles and methods, subject to the limits of the responses. This enables a more responsive research process that allows more than one iteration of analysis of a dataset, where researchers can glean insights not possible from more quantitative research designs.

Qualitative and sentiment analysis methods broaden the ability of researchers to draw insights on the public's perspective towards transportation issues. This analysis demonstrates the potential of qualitative analysis to categorize responses and find areas of

consensus or disagreement within public responses. This analysis also demonstrates the ability of sentiment analysis tools such as LIWC to parse out the meaning and emotion behind responses to general open-ended questions. Additionally, tracking these sentiments over time can reveal further insights into the changing attitudes of the public.

LIMITATIONS OF STUDY

One limitation of this study was due to the phrasing of the open-ended question, "what is the most significant transportation issue affecting you personally in your region?" By asking respondents to report on the most significant issue affecting them, the question invites respondents to consider only what is bothering them about transportation in the region. More neutral phrasing of the original question could have resulted in an entirely different set of responses and sentiments. Results from this study therefore have implications for the creators of public polls to craft more thoughtful public poll questions.

Additionally, since computer-based sentiment analysis considers the frequency of positive and negative words, this only implies associations with these topics, and should not be considered a conclusive analysis. For instance, respondents mentioning "gas price" often included no further description of how or why this is a significant issue for them. At the time this poll was released, the average price of gas nationwide was $3.70 per gallon; the most expensive it had been since 2013. Though we might assume gas prices could be negatively associated for respondents as an economic restriction on mobility, the lack of further description kept the average sentiment score as neutral. Therefore, this analysis can be useful to identify important topics for the respondents to this poll, but may not be conclusive regarding attitudes for all topics.

Finally, although many commented on the lack of public transportation in their region, these observations do not necessarily mean that the commenters themselves

would be willing to utilize public transportation were it made available. The comments themselves do not provide evidence for or against the potential ridership of respondents. However, as seen in the demographic analysis, many respondents who commented regarding public transportation were themselves transit riders. Although comments may reflect the needs and ideas of transit riders, they should not be interpreted as indicators of potential demand for public transportation service. Instead, they are best interpreted as respondents' suggestions for how to improve mobility in their regions.

DIRECTIONS FOR FUTURE RESEARCH

In tandem with the results from the larger Texas Transportation Poll, qualitative analysis of open-ended questions provides additional insight into the freely expressed viewpoints of Texans, in their own words. As demonstrated through this report, qualitative and sentiment analysis add valuable context to quantitative results. The power of qualitative and sentiment analysis of open-ended survey results can be leveraged in future public opinion polls to elicit responses that address specific questions held by decision makers, lead to further understanding of public sentiment on specific issues, and offer the public an opportunity to weigh in with ideas for how to solve the most pressing transportation issues facing them in their regions. Additionally, more robust regional polling can help researchers and policy makers better understand transportation issues at the regional level. More insight from the open-ended question could be drawn at the regional scale with a larger sample size at the regional level.

In order to maximize the ability of qualitative and sentiment analysis to inform transportation policy, several key elements should be considered when crafting future open-ended survey questions:

- Does the phrasing of the question steer respondents to offer positive or negative sentiments on a topic?
- Are researchers seeking answers to specific research questions, for example, solutions to pressing transportation issues? Incorporating these specific queries into the survey will help to elicit relevant answers.

Furthermore, this study demonstrates a potentially new and unique source of data that can be used to enhance public engagement efforts in transportation planning and decision-making. Future research could validate these data further by comparing comments received through the statewide TTP with comments received in a specific statewide or local planning effort.

Appendix: 2014 Texas Transportation Poll

The Texas Transportation Poll: A Statewide Assessment of Public Opinion on Transportation Issues

Thank you for agreeing to complete this important survey. If you would rather complete the survey on-line, please go to *transoportationintexas.com*. If you prefer to complete the printed survey, please return it in the postage-paid envelope provided.

PART 1: TRAVEL BEHAVIOR

The first section of this survey will deal with your general travel behavior, including how you travel, how you may or may not be affected by traffic congestion and your thoughts on various ways (other than personal vehicle) you and others may travel.

1. Which of the following is your *primary* means of transportation?

___(1) Personal auto (including motorcycle)
___(2) Public transportation
___(3) Bicycle
___(4) Walking
___(5) Other

2. Do you own or lease a personal vehicle? ___(1) Yes __(2) No

2a. [IF YES to #2] Over the last twelve months, how many miles have you driven your personal vehicle?

_____ miles

3. Have you used public transportation to make at least one trip in the last 30-days in Texas? Please note, for purposes of this survey, a trip is defined as one way travel from any starting point (origin) to an ending point (destination) for any reason at any time of day.
___(1) Yes __(2) No

4. Have you used a bicycle to make at least one trip in the last 30-days in Texas? Please do not include bicycle trips you made for recreational purposes.
___(1) Yes __(2) No

5. Have you walked to make at least one trip in the last 30-days in Texas? Please do not include walk trips you made for recreational purposes.
___(1) Yes __(2) No

6. Do you ever experience congestion while traveling in your region? ___(1) Yes __(2) No

6a. [IF YES to #6] Using a scale of 0 to 10, where 0 is assigned to congestion that is not bad at all and 10 is assigned to congestion that is extremely bad, how would you rate congestion in your community? (circle the number corresponding to your rating)

NOT BAD AT ALL 0----1----2----3----4----5----6----7----8----9----10 EXTREMELY BAD

7. Have you done any of the following in the last year? Please reply yes or no to each.

___(1) Changed work hours or telecommuted to avoid congestion
___(2) Carpooled
___(3) Purchased a more fuel efficient vehicle
___(4) Made a residential choice based on congestion
___(5) Made an effort to travel less because of fuel prices
___(6) Used public transportation, biking or walking as a means to make trips you would have made with your personal vehicle in the past

8. Please indicate which of the following have done in the past 30 days. (Please choose all that apply.)

___(1) Used a global positioning system (GPS) device (not including a smart phone)
___(2) Used a smart phone application (app)
___(3) Visited a website that has access to live traffic cameras
___(4) Tuned into local TV news for traffic reports
___(5) Tuned into local radio news for traffic reports

	9. PERCEPTIONS OF CONGESTION Please circle the number that describes your level of agreement with the following statements about congestion in the REGION WHERE YOU LIVE. Circle "NO" if you have no opinion..	Strongly Disagree	SomewhatDisagree	Neutral	SomewhatAgree	Strongly Agree	No Opinion
A	Congestion in my region is caused by the influx of people wanting to live or work here	1	2	3	4	5	NO
B	Congestion in my region is caused by deteriorating infrastructure	1	2	3	4	5	NO
C	Congestion in my region is caused by an under investment in public transportation	1	2	3	4	5	NO
D	Congestion in my region is caused by an under investment in roads	1	2	3	4	5	NO
E	Congestion is a byproduct of economic prosperity	1	2	3	4	5	NO
F	Congestion in my region affects the price of goods and services	1	2	3	4	5	NO

PART 2: TRAVEL SOLUTIONS

10. What is the most significant transportation issue affecting you personally in your region today?

_____

11. Using a scale of 0 to 10, where 0 is assigned to a group that you believe should have the least influence on establishing transportation policy in your region and 10 is assigned to a group that you believe should have the most influence, please assign a score to each of the following user groups? Circle "NO" if you have no opinion.

	Groups that Influence Transportation	**0=Least Influence**										**Most Influence=10**	
A	Auto drivers	0	1	2	3	4	5	6	7	8	9	10	NO

B	Transit riders	0	1	2	3	4	5	6	7	8	9	10	NO
C	Bicyclists	0	1	2	3	4	5	6	7	8	9	10	NO
D	Pedestrians	0	1	2	3	4	5	6	7	8	9	10	NO
E	Freight shippers	0	1	2	3	4	5	6	7	8	9	10	NO
F	Environmental groups	0	1	2	3	4	5	6	7	8	9	10	NO
G	Chambers of commerce /Local business organizations	0	1	2	3	4	5	6	7	8	9	10	NO
H	Private corporations	0	1	2	3	4	5	6	7	8	9	10	NO
I	Elected political officials	0	1	2	3	4	5	6	7	8	9	10	NO
J	Neighborhood associations	0	1	2	3	4	5	6	7	8	9	10	NO
K	City or municipal government	0	1	2	3	4	5	6	7	8	9	10	NO
L	County government	0	1	2	3	4	5	6	7	8	9	10	NO
M	State department of transportation	0	1	2	3	4	5	6	7	8	9	10	NO

12. PERCEPTIONS OF CONGESTION Please circle the number that describes your level of agreement with the following statements.		Strongly Disagree	SomewhatDisagree	Neutral	Somewhat Agree	Strongly Agree	No Opinion
A	I would use my bicycle or walk more if I felt safer doing so	1	2	3	4	5	NO
B	Public transportation reduces congestion in my region	1	2	3	4	5	NO
C	Public transportation is available to me in my region	1	2	3	4	5	NO
D	Taking public transportation is convenient in my region	1	2	3	4	5	NO
E	Bicycling reduces congestion in my region	1	2	3	4	5	NO
F	Walking reduces congestion in my region	1	2	3	4	5	NO
G	I have travel options other than a personal vehicle	1	2	3	4	5	NO
H	In general, highways (FM, RM, Loop, US, SH, Interstate, etc.) are barriers that prevent or discourage me from riding my bicycle or walking to my destinations	1	2	3	4	5	NO

13. Using a scale of 0 to 10, where 0 is assigned to a strategy that you strongly oppose for helping solve transportation issues in your region and 10 is assigned to a strategy that you strongly support, please assign a score to each of the following strategies. Circle "NO" if you have no opinion

Strategies		**0=Strongly Oppose**									**Strongly Support=10**		
A	Encouraging private corporations to invest in transportation	0	1	2	3	4	5	6	7	8	9	10	NO
B	Building more toll roads	0	1	2	3	4	5	6	7	8	9	10	NO

C	Encouraging high density development around public transportation stations (sometimes referred to as transit oriented development)	0	1	2	3	4	5	6	7	8	9	10	NO
D	Providing more carpool lanes	0	1	2	3	4	5	6	7	8	9	10	NO
E	Telecommuting or working flexible hours	0	1	2	3	4	5	6	7	8	9	10	NO
F	Additional public transportation service	0	1	2	3	4	5	6	7	8	9	10	NO
G	Carpooling	0	1	2	3	4	5	6	7	8	9	10	NO
H	Encouraging the use of non personal auto modes of transportation (walk, bicycle, public transportation)	0	1	2	3	4	5	6	7	8	9	10	NO
I	Dedicating more money to maintaining the current system	0	1	2	3	4	5	6	7	8	9	10	NO
J	Adding more lanes to state-maintained roads	0	1	2	3	4	5	6	7	8	9	10	NO
K	Investing more in the shipment of goods and services	0	1	2	3	4	5	6	7	8	9	10	NO
L	Investing more in connecting rural communities to urban areas	0	1	2	3	4	5	6	7	8	9	10	NO
M	Encouraging shippers to change the travel patterns they regularly use to deliver goods	0	1	2	3	4	5	6	7	8	9	10	NO
L	Timing traffic signals more effectively	0	1	2	3	4	5	6	7	8	9	10	NO
O	Doing a better job of managing accidents and/or clearing automobile wrecks	0	1	2	3	4	5	6	7	8	9	10	NO

PART 3: FUNDING ISSUES

14. Do you believe there is a need to increase transportation funding in the State of Texas?

___(1) Yes __(2) No __(9) Don't know

15. In Texas, the majority of transportation funding comes from revenue generated from the fuel tax. Please check which of the following statements you believe to be most accurate.

___(1) The state fuel tax is a flat tax (a fixed amount paid per gallon of fuel purchased) – answer #15a

___(2) The state fuel tax is sales tax (a fixed percentage of the amount paid per gallon of fuel) – answer #15b

15a. [IF FLAT TAX] How much to fuel taxes contribute to the cost of a gallon of gas? (enter "DK" if you don't know)

Amount per gallon: $_____

15b.[IF SALES TAX] What is the percent sales tax per gallon of fuel purchased that goes to the state fuel tax?

(enter "DK" if you don't know)

Percent per gallon: _____%

16. In addition to the fuel tax please indicate if you believe each of the following is currently used to help fund transportation in Texas.

(A) Federal income tax ..... YES ..... NO ..... UNSURE
(B) Tolls ..... YES ..... NO ..... UNSURE
(C) Property tax ..... YES ..... NO ..... UNSURE

(D) General sales tax ..... YES .....NO..... UNSURE
(E) Vehicle registration fees ... YES .....NO..... UNSURE
(F) Driver's license fees ..... YES .....NO..... UNSURE
(G) Motor vehicle sales tax ..... YES .....NO..... UNSURE

17. Using a scale of 0 to 10, where 0 is assigned to a mechanism you strongly oppose and 10 is assigned to a mechanism you strongly support, please rate the following mechanisms to help generate additional transportation funding. Circle "DK" if you don't know.

	Funding Mechanism	0=Strongly Oppose										Strongly Support=10	
A	Increasing the state fuel tax by five cents per gallon	0	1	2	3	4	5	6	7	8	9	10	DK
B	Increasing the state fuel tax by ten cents per gallon	0	1	2	3	4	5	6	7	8	9	10	DK
C	Dedicating state sales tax on vehicles to transportation	0	1	2	3	4	5	6	7	8	9	10	DK
D	Linking the state fuel tax to the average yearly inflation rate	0	1	2	3	4	5	6	7	8	9	10	DK
E	Replace the state fuel tax with a 6.25% state sales tax on fuel	0	1	2	3	4	5	6	7	8	9	10	DK
F	Replace the state fuel tax with a user fee of 1-cent per mile driven	0	1	2	3	4	5	6	7	8	9	10	DK
G	Increase vehicle registration fees from $65.00 per year to $75.00 per year	0	1	2	3	4	5	6	7	8	9	10	DK
H	Increase vehicle registration fees from $65.00 per year to $115 per year	0	1	2	3	4	5	6	7	8	9	10	DK

	18. SUPPORT FOR NEW SOURCES OF TRANSPORTATION REVENUE Please rate your level of agreement with the following statements about public transportation, walking and biking. Circle "NO" if you have no opinion.	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree	No Opinion
A	I support investing more public tax dollars in public transportation, because it helps reduce congestion in my region	1	2	3	4	5	NO
B	I support investing more public tax dollars in public transportation across the state	1	2	3	4	5	NO
C	I support investing more public tax dollars in public transportation in my region	1	2	3	4	5	NO
D	I support investing more public tax dollars in infrastructure that makes bicycling in my region easier	1	2	3	4	5	NO
E	I support investing more public tax dollars in infrastructure that makes walking in my region easier	1	2	3	4	5	NO

19. Using a scale of 0 to 10 where, 0 is strongly disagree and 10 is strongly agree, please rate the following statements regarding transportation funding mechanisms. Circle "DK" if you don't know.

	Funding Mechanism	0=Strongly Disagree										Strongly Agree=10	
A	A transportation funding mechanism should include a guarantee that 100% of all revenues are spent on transportation projects	0	1	2	3	4	5	6	7	8	9	10	DK
B	A transportation funding mechanism should assure a predictable long term solution	0	1	2	3	4	5	6	7	8	9	10	DK
C	A transportation funding mechanism should be linked to inflation	0	1	2	3	4	5	6	7	8	9	10	DK
D	A transportation funding mechanism should be paid by system users	0	1	2	3	4	5	6	7	8	9	10	DK
E	A transportation funding mechanism should be independent of fuel	0	1	2	3	4	5	6	7	8	9	1	DK

	source											0	
F	A transportation funding mechanism should reduce dependency on foreign oil	0	1	2	3	4	5	6	7	8	9	10	DK
G	A transportation funding mechanism should promote clean energy	0	1	2	3	4	5	6	7	8	9	10	DK
H	A transportation funding mechanism should encourage business and commerce in Texas	0	1	2	3	4	5	6	7	8	9	10	DK
I	A transportation funding mechanism should capitalize on the current energy boom	0	1	2	3	4	5	6	7	8	9	10	DK

PART 4: CUSTOMER SATISFACTION/TRUST IN GOVERNMENT AGENCIES

20. Using a scale of 0 to 10, where 0 is strongly disagree and 10 is strongly agree, rate the following statements. Please pay close attention to each statement, as some are only slightly different from one another. Circle "DK" if you don't know.

Statements About Transportation Issues		0=Strongly Disagree									Strongly Agree=10		
A	The transportation issues in my region are similar to those in other regions of the same size	0	1	2	3	4	5	6	7	8	9	10	DK
B	The transportation issues Texans face are similar to those faced by residents of other states	0	1	2	3	4	5	6	7	8	9	10	DK
C	Disagreement between political parties is an obstacle in identifying a solution to transportation issues in my region	0	1	2	3	4	5	6	7	8	9	10	DK
D	Local elected officials understand my expectations of the transportation system	0	1	2	3	4	5	6	7	8	9	10	DK
E	The state legislators from my region understand my expectations of the transportation system	0	1	2	3	4	5	6	7	8	9	10	DK
F	Local government should take a more significant role in addressing transportation issues in my region	0	1	2	3	4	5	6	7	8	9	10	DK
G	State government should take a more significant role in addressing transportation issues in my region	0	1	2	3	4	5	6	7	8	9	10	DK
H	Federal government should take a more significant role in addressing transportation issues in my region	0	1	2	3	4	5	6	7	8	9	10	DK

21. Using a scale of 0 to 10, where 0 indicates complete disagreement and 10 indicates complete agreement, please rate each of the following statements. Circle "DK" if you don't know.

Statements About Transportation Agencies		0=Complete Disagreement									Complete Agreement=10		
A	Transportation agencies provide good customer service	0	1	2	3	4	5	6	7	8	9	10	DK
B	Transportation agencies work efficiently to complete projects	0	1	2	3	4	5	6	7	8	9	10	DK
C	Transportation agencies understand my expectations of the transportation system	0	1	2	3	4	5	6	7	8	9	10	DK
D	Transportation agencies maintain a safe system	0	1	2	3	4	5	6	7	8	9	10	DK
E	Transportation agencies do a good job of maintaining financial transparency	0	1	2	3	4	5	6	7	8	9	10	DK

F	Transportation agencies should seek partnerships with private corporations when they can to help find solutions to transportation issues	0	1	2	3	4	5	6	7	8	9	10	DK
G	Transportation agencies do the best job they can with the budget they have	0	1	2	3	4	5	6	7	8	9	10	DK
H	Transportation agencies are innovative in finding solutions to transportation issues	0	1	2	3	4	5	6	7	8	9	10	DK
I	Transportation agencies do a good job connecting my community to others	0	1	2	3	4	5	6	7	8	9	10	DK

PART 5: DEMOGRAPHICS

22. On a scale from 1 to 7, where 1 is extremely liberal, 7 is extremely conservative, and 4 is exactly in the middle, where would place yourself?

EXTREMELY LIBERAL 1----2----3----4----5----6----7 EXTREMELY CONSERVATIVE

23. Generally speaking, do you think of yourself as a Democrat, Independent, Republican, Other/Not sure?

___(1) Democrat __(2) Independent ___(1) Republican __(2) Other/Not Sure

24. Are you a registered voter? ___(1) Yes __(2) No __(2) Don't know

25. Do you have any children currently enrolled in school in Texas? SELECT ALL THAT APPLY

___(1) Yes – I have a child/children < 18 enrolled in public school
___(2) Yes – I have a child/children < 18 enrolled in private school
___(3) Yes – I have a child/children < 18 enrolled in home school
___(4) No
___(9) Don't Know

26. Are you of Hispanic, Latino or Spanish origin?

___(1) No, not of Hispanic, Latino or Spanish origin
___(2) Yes, Mexican, Mexican American, Chicano
___(3) Yes, Puerto Rican
___(4) Yes, Cuban
___(5) Yes, another Hispanic, Latino or Spanish origin
___(6) Don't Know

27. What is your race?

___(01) White
___(02) Black, African American or Negro
___(03) American Indian or Alaskan Native
___(04) Asian Indian
___(05) Chinese
___(06) Filipino
___(07) Japanese
___(08) Korean
___(09) Vietnamese
___(10) Native Hawaiian
___(11) Guamanian or Chamorro
___(12) Other:_____
___(13) Don't Know

28. What is your current relationship status?

___(1) Now married
___(2) Widowed
___(3) Divorced
___(4) Separated
___(5) Never married
___(6) Living with partner, not married
___(9) Don't Know

29. Which of the following age categories best describes your age?

___(1) 18-24
___(2) 25-34
___(3) 35-44
___(4) 45-54
___(5) 55-64
___(6) 65+
___(9) Don't Know / Refuse

30. What is the highest level of education you have completed?

___(1) No schooling completed
___(2) Less than high school diploma/ GED
___(3) High school diploma/GED
___(4) Some college, no degree
___(5) Associate degree or technical degree
___(6) Bachelor's degree
___(7) A graduate or professional degree
___(9) Don't Know

31. What category best describes your yearly household income? By yearly household income we mean pre-tax earnings from jobs that you or other household members have had during the past 12 months.

___(01) Less than $10,000
___(02) $10,000 to $14,999
___(03) $15,000 to $24,999
___(04) $25,000 to $34,999
___(05) $35,000 to $49,999
___(06) $50,000 to $74,999
___(07) $75,000 to $99,999
___(08) $100,000 to $149,999
___(09) $150,000 to $199,999
___(10) $200,000 or more
___(99) Don't know

32. Do you currently work for pay?

___(1) Yes
___(2) No
___(9) Don't Know

32a. [IF NO to #32] Which category best describes your situation?

___(1) Retired
___(2) Not retired, student
___(3) Not retired, not a student
___(4) Unemployed, looking for work
___(5) I don't work because of a disability
___(6) Homemaker or stay-at-home parent
___(7) Volunteer
___(8) Other: _____

33. Do you currently have a valid Texas driver's license?

___(1) Yes
___(2) No
___(9) Don't Know

34. How many vehicles are available to you and other members of your household? _____ vehicles (enter number)

35. What is your household size? _____ persons (enter number)

36. What is your HOME zip code? _____

37. What is your gender?

___(1) Male
___(2) Female

This concludes the survey. Thank you for your time!

Please Return Your Completed Survey in the Enclosed Postage Paid Envelope
Addressed to:
ETC Institute, 725 W. Frontier Circle, Olathe, KS 66061

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